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The Impact of Middle School Scheduling Practices on Adolescent Math Achievement in Louisiana Public Schools

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THE IMPACT OF MIDDLE SCHOOL SCHEDULING PRACTICES ON ADOLESCENT MATH ACHIEVEMENT IN LOUISIANA PUBLIC SCHOOLS

by

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ABSTRACT

Research on middle-level schools and student achievement revealed a drop in academic performance when students transitioned from elementary school to a traditional middle school. In the United States, the middle school years have historically seen a decline in student achievement following a transition from elementary school.

According to the National Center for Education Statistics, the performance of United States eighth-grade students in mathematics continued to lag behind globally based on the 2015 Trends in International Mathematics and Science Study (U.S. Department of Education, 2017). Specifically, United States eighth graders were ranked 12th in mathematics, which was three notches down from eight years prior. Similarly, the Louisiana Department of Education (2018), found Louisiana students struggled in mathematics compared to other tested subjects. In addition, middle school student achievement in Louisiana revealed consistently lower performance in mathematics compared to the other content areas.

The purpose of this study was to determine if a particular scheduling practice had a significant effect on overall student math performance in Louisiana public middle schools. The sample population for the study included 179 schools containing grades six, seven, and eight. An independent t-test was conducted with the data for each of six hypotheses to determine if there was a difference in the group mean proficiency and

mastery scores on the mathematics portion of the 2018 state assessment in Louisiana public middle schools that implemented either a traditional or block schedule.

Based on the results of the independent t-test of the sample population, sixth graders in block scheduled schools demonstrated significantly higher proficiency and mastery scores on the math portion of the Louisiana assessment in the spring of 2018. In addition, seventh graders in block scheduled schools demonstrated significantly higher mastery scores on the math portion of the Louisiana assessment in the spring of 2018. While not significant in all cases, the mean proficiency and mastery scores for sixth, seventh, and eighth-grade math on the Louisiana assessment in 2018 were higher in the sample schools utilizing block scheduling.

Recommendations from the study include using the schedule as only one factor for a school improvement effort.

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DEDICATION

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CHAPTER 1

STATEMENT OF THE PROBLEM

Introduction

Historically, academic performance of middle-level school students paled in comparison to their elementary success (Meyer, 2011). As reported by Meyer in his feature article, "*The Middle School Mess*," much speculation had arisen over the years on the value of middle school education rather than on Kindergarten to grade eight education. In particular, Meyer (2011) stated research on the middle school concept regarding increased rigor of academia and school system accountability had noted mixed conclusions in relation to the elements necessary to assure student success in the middle school configuration. Similarly, the Association for Middle Level Education (AMLE) also took a strong stance by stating that middle-level education should be a critical link in the pre-school to college continuum (Association for Middle Level Education, 2010).

During the early 20th century, schools in the United States were mainly K–8 models before transitioning to the creation of the junior high model to address growing enrollment (Styron & Nyman, 2008; Tamer, 2012). In their 2008 study of middle school student performance, Styron and Nyman reported the first junior high opened serving grades seven to nine in 1909 (Styron & Nyman, 2008). While junior highs were not as widespread in the early part of the 20th century, Styron and Nyman (2008) explained the restructuring was not only in response to growing enrollment but the desire to better serve

the needs of young adolescents while offering a smoother transition between elementary and high school. Moving away from K-8 school structures, Tamer (2012) explained that the newly formed junior high schools started with grade seven, then students continued on the junior high track for either two years or three depending on the grade span.

During the 1950s and 1960s, the educational reform pendulum swung again as school districts moved away from the junior high model to a middle-level grade band serving students in grades five to nine (Alexander & George, 1993). According to these researchers, critics of a departmentalized style of the junior high school argued that student engagement was reduced as a result of the abrupt change from self-contained elementary classrooms to several subject-specific teachers.

In their writings, Alexander and George (1993) revealed one goal of the middle school was to create a learning environment similar to the elementary schools in which teaming and interdisciplinary learning was a focus. Short and Greer (2002) also supported the effort to increase individualized learning and student engagement in middle school; thus, school faculties were typically organized as interdisciplinary teams responsible for a group of students.

According to Armstrong (2006), the onset of the middle school movement was to address the developmental needs of adolescence, which required educators to focus on the social and emotional needs of students as well as academic rigor. Gordon, Peterson, Gdula, and Klingbeil (2011) found that despite efforts of researchers and practitioners of middle-level education over the course of a century, the transition from elementary to middle school continued to have a negative impact on students' social and emotional well-being. These researchers emphasized that students transitioning to a new school

from elementary grades to middle school reported lower self-esteem. Alexander led the middle school movement and called for the implementation of school structures, instructional support, and effective pedagogy to meet the challenging needs of the middle school student (Association for Middle Level Education, 2010).

The middle school model was a strong example of school restructuring and was innovative for the time. This type of school restructuring was to break away from the "factory-like" model of education (Short & Greer, 2002). These researchers found junior high schools were transformed to middle schools by eliminating academic departments and lock-step progression from class to class as in traditional school schedules comprised of 50-minute, back-to-back classes each taught by a different teacher. This type of traditional class scheduling was replaced with more flexible blocks of time for core classes. Along with the elimination of the departmentalization of core academics, the high school practice of competitive sports was removed from the junior high and middle school level during the middle school movement (Manning, 2000).

Schaefer, Malu, and Bogum (2016) stated the middle school movement continued to dominate the 1970s with a strong focus on research identifying and defining the characteristics of an effective middle school. These researchers also documented that educational studies about middle-level schooling conducted in the 1980s led to the development of middle-level principles and practices known as the middle school concept (Schaefer et al., 2016). Beane and Lipka (2006), also emphasized that the middle school concept focused on the social, emotional, and physical needs of the middle school student and should (a) improve academic achievement for all students, (b) meet the needs of young adolescents, (c) provide a challenging and integrative curriculum, (d) create

supportive and safe environments through such structures as small teaching teams, (e) ensure better teacher preparation for the middle grades, and (f) improve relationships with families and communities.

In order to examine promising new approaches to educating young adolescents, the Carnegie Corporation of New York established the Carnegie Council on Adolescent Development in 1986 (Carnegie Council on Adolescent Development, 1989). The council created a group called "The Task Force on Education of Young Adolescents" to study middle-level reform practices. The Carnegie Council's task force was comprised of members from many professional sectors, including education, research, and health.

The findings of the task force revealed conflicts between the theory and practice of educating and meeting the needs of young adolescents. Critics of the middle school concept stated the result of the reform led to vague academic expectations and complacency in the middle school years (Yecke, 2005). Therefore, the Carnegie Council's task force called for a middle-level reformation movement involving all sectors of society, including the President and Congress. Support of this movement and the middle school concept was the work of both the Carnegie Council on Adolescent Development (1989) and the Association for Middle Level Education (2010), formerly the National Middle School Association. Each entity published documents outlining what a high-quality middle-level school should be able to accomplish (Association for Middle Level Education, 2010; Carnegie Council on Adolescent Development, 1989).

In 1989, the Carnegie Council on Adolescent Development published "Turning Points: Preparing American Youth for the 21st Century." Based on the research of the "Task Force on Education of Young Adolescents," the council recommended the

following structures and practices for middle-grade education in order to better serve young adolescents (a) create small communities for learning, (b) teach a core academic program, (c) shape the educational program to fit the needs of students, (d) empower teachers and administrators to make decisions about the experiences of middle-grade students, (e) staff middle grade schools with teachers who are experts at teaching young adolescents, (f) provide health and fitness programs, (g) increase family engagement, and (h) connect schools with communities (Carnegie Council on Adolescent Development, 1989).

The findings of the Carnegie Council on Adolescent Development (1989) were also reinforced by the AMLE (2010), which noted that a young adolescent would become a self-sufficient and successful adult if exposed to an educational program that is developmentally responsive, challenging, empowering, and equitable. The AMLE study further delineated that a successful middle school should be structured on sixteen interdependent characteristics in three focus areas. The first area of concentration highlighted a strong curriculum for instruction with various assessments that included a deep appreciation of the young adolescent, involving active learning, and a challenging curriculum with multiple learning approaches utilizing varied assessments. The second area of concentration entailed learning and organizational strategies that included a shared vision, committed leadership, courageous and collaborative leaders, professional development, and appropriate organizational structures. The last area to be considered was that of the school's culture and sense of community, which incorporated the school environment, appropriate adult advocates, strong guidance personnel, health and wellness

opportunities, family involvement, as well as the inclusion of community and business partners.

Twenty-first-century schooling for young adolescents continued to demand school structure and high-quality programs for students to succeed. The Association for Middle Level Education (2010) called for a sense of urgency to establish middle-level programs and to commit to the philosophy of middle-level education. At the same time, Styron and Nyman (2008) acknowledged the need for middle-level schooling to provide a smooth transition between elementary and middle school as well as to provide a program suitable for adolescents. These researchers concluded that in order to accomplish a continued trajectory of success for students exiting the elementary setting, middle schools must provide the school structure so all components of the middle school concept can be fully integrated into the school day in order for students to be successful. In addition, the researchers stressed that the middle school concept components and practices were dependent on the structure of the school day, which allowed for teams of teachers to collaborate on curriculum, instruction, and assessment in order to meet the needs of students.

Background of Problem

Research on middle-level schools and student achievement revealed a drop in academic performance when students transitioned from elementary school to a traditional middle school. A longitudinal study conducted by Schwerdt and West in 2011 examined how a transition for Florida students from an elementary setting to a traditional middle school setting impacted their academic achievement. The research examined data of students in grades three to ten for ten consecutive school years. The researchers reported

a drop in math and reading achievement on standardized assessments during the transition year between elementary and middle school.

Student achievement continued to be a national priority in the 21st century and the number of instructional minutes allotted per subject was a priority of teachers (Mattox, Hancock, & Queen, 2005). In the United States, the middle school years have historically seen a decline in student achievement following a transition from elementary school. Williams, Kirst, and Haertel (2010), reported the research teams at EdSource and Stanford University confirmed student achievement in grades six to eight mathematics was lower compared to performance in previous elementary years. Their research also found that 57% of fifth graders in California public schools scored proficiency or better on the 2009 state math assessment compared to only 49% of sixth graders, 43% of seventh graders, and 30% of eighth graders (Williams et al., 2010).

According to the National Center for Education Statistics, the performance of United States eighth-grade students in mathematics continued to lag behind globally based on the 2015 Trends in International Mathematics and Science Study (TIMSS) (U.S. Department of Education, 2017). In 2015, United States eighth graders were ranked 12th in mathematics, which was three notches down from ninth in 2007 (U.S. Department of Education, 2017). In addition, the report indicated Canada, Hong Kong, Japan, and Singapore were among the countries with higher average scores than the United States in eighth-grade mathematics.

Similarly, the Louisiana Department of Education (2018), found Louisiana students struggled in mathematics compared to other tested subjects. The 2017 Louisiana Educational Assessment Program (LEAP 2025) results for grades three through eight

revealed a slight increase in the percentage of students scoring "Mastery" or above in English Language Arts (ELA), a slight decrease in the percentage of those scoring at that level in mathematics, and no change in science (Louisiana Department of Education, 2017b).

Louisiana student achievement in the four content areas of English Language Arts, Mathematics, Science, and Social Studies is measured using five performance bands of achievement (a) advanced, (b) mastery, (c) basic, (d) approaching basic, and (e) unsatisfactory (Louisiana Department of Education, 2017a). The goal for all students is to reach a level of mastery or better in all grades and content areas by the end of eighth grade. The percentage of Louisiana students in grades five through eight scoring mastery or advanced in the four content areas over a period of four years is shown in Table 1.

Table 1

Percentage of Louisiana Students Scoring Mastery or above by Subject and Grade Level, 2015-2018

Grade	Test Year	English Language Arts	Math	Science	Social Studies
5th	2015	32	28	18	18
	2016	38	33	20	-
	2017	41	32	21	19
	2018	43	30	-	21
6th	2015	38	25	22	24
	2016	39	28	23	-
	2017	35	28	25	21
	2018	34	28	-	25
7th	2015	34	22	27	25
	2016	41	26	30	-
	2017	41	25	31	30
	2018	43	25	-	34
8th	2015	40	32	19	15
	2016	49	30	21	-
	2017	44	27	22	35
	2018	45	28	-	37

Note. Missing values indicate no data available due to assessment being a pilot test.

While students across the state have made gains towards mastery, the pace is slow, especially in mathematics. A closer analysis of the most recent 2018 student achievement in Louisiana revealed consistently lower performance in mathematics compared to the other content areas across grades six, seven, and eight (Louisiana Department of Education, 2018).

Purpose

This study will focus on the organizational structure, specifically the middle school schedule, which should provide a strong foundation for the components of the middle school concept to be incorporated in the school day and lead to student and school success. A successful middle school that includes active learning, a dedicated team of teachers and leaders, the incorporation of community resources and family involvement

is definitely possible and responsive as noted in the research (Association for Middle Level Education, 2010; Beane & Lipka, 2006; Carnegie Council on Adolescent Development, 1989; Styron & Nyman, 2008).

Research on middle-level education suggests schools create small learning communities and foster high-quality relationships with students and their families in order for student achievement to improve (Carnegie Council on Adolescent Development, 1989). According to AMLE (2010), "the ways schools organize teachers and group and schedule students had a significant impact on the learning environment" (p. 31). Different middle school schedule configurations have been used over the last few decades (i.e., block schedules, traditional schedules). The purpose of this study is to examine various scheduling practices implemented at the middle school level in Louisiana public schools to determine the impact, if any, on adolescents' math achievement.

Theoretical Framework

A school-wide reformative practice of altering the way a school day is structured, specifically the bell schedules students follow, embodies the tenets of Classical Organizational Theory. Historically, organizational theory was divided into two management perspectives – scientific and administrative (Lunenburg & Ornstein, 2004). Scientific management focused on the management of the work and the workers tasked to complete it, whereas administrative management focused on the structure of the entire organization and the systems in place to support productivity.

The 20th century, as well as the beginning of the 21st century, had been a time of continuous education reform. The reform in the late 1800s and beginning 1900s had two

prevailing themes - one of efficiency and the other focused on individual growth (Short & Greer, 2002). During this industrialized time, Lunenburg and Ornstein (2004) explained how the standardization of work in the schoolhouse was defined. The geography of classrooms was set up identically in rigid rows of immovable desks with the teacher positioned at the front of the room in command position. Students were taught by drills, memorization, and regimented routines. While the principles of scientific management were logical to increase efficiency, individual differences were ignored.

According to Short and Greer (2002), since the number of students was growing rapidly in the early 20th century, individual growth was not embraced immediately as compared to efficiency during this time. In the early 20th century, G. Stanley Hall was the first psychologist to study adolescents and determine their specific needs as it related to education (Roney, Anfara, & Brown, 2008). His research influenced the field of education to organize schooling of adolescents into junior and senior periods. The junior high period focused on grades seven, eight, and nine, while the senior period included grades ten, eleven, and twelve. Research conducted by Alexander and George (1993) supported Hall and reported the intent of the junior high structure was for educators to understand and respond to the developmental needs of young adolescents and offer a richer curriculum tailored to this age student.

Supporting the importance of school organization was the National Association of Secondary School Principals. According to the National Association of Secondary School Principals, “the organization of the school should contribute to a sense of belonging on the part of the people who work and learn there, and should mitigate against anonymity and alienation from the primary mission of the school” (Mertens, Anfara, & Caskey,

2007, p. 11). The structure of the school day can have a profound impact on the success of student achievement.

Significance of the Research Problem

Following the enactment of the Every Student Succeeds Act (ESSA), Louisiana embarked on the development and implementation of the Louisiana Student Standards. Louisiana recognized the need to raise academic expectations and create a more rigorous school accountability system (Louisiana Department of Education, 2015). With the rising emphasis on student achievement and overall school performance, maximizing the time allotted during the school day was paramount.

Reports over the past few decades have highlighted middle grades achievement or lack of progress, school responsiveness to young adolescents' needs, educational equity in the middle schools, and increased academic rigor in the classrooms. Meyer (2011) noted the middle school years often marked a decline in student achievement. His research demonstrated mixed conclusions regarding increased rigor, school accountability, and the elements necessary to assure student success in the middle school configuration.

The research being conducted for this study will provide valuable evidence of current scheduling practices in the middle school setting, grades six to eight. Limited research has been conducted in Louisiana regarding the impact scheduling has on middle school students' academic achievement in the public setting. The goal of this study is to collect quantitative data to determine if school scheduling practices have an impact on math achievement among middle school students in grades six, seven, and eight.

Grade level mathematics achievement on state assessments will be analyzed among Louisiana public schools implementing the block or traditional school schedule. The Louisiana Educational Assessment Program 2025 (LEAP 2025) test results for students in grades six, seven, and eight will be analyzed for this study. Documenting current middle school scheduling practices and the effects of such practices on student achievement will be beneficial to boards of education, school administrators, and other professionals interested in school reform.

Research Questions

Research Question 1: Is math achievement, as measured by percent proficient on the Louisiana yearly assessment, greater among middle school students in grades six, seven, or eight in a school utilizing block scheduling compared to a middle school utilizing a traditional six, seven, or eight period day?

Research Question 2: Is there a greater percentage of sixth, seventh, or eighth-grade students performing in the mastery or above range on the Louisiana yearly assessment in mathematics when those students attended a school utilizing a block schedule versus those students attending a middle school on a traditional six, seven, or eight period day?

Research Hypotheses

The following research hypotheses address research question one regarding Louisiana middle school students' mathematics proficiency on the state assessment, LEAP 2025, in the spring of 2018.

H1: There will be a statistically significant difference in the levels of math proficiency among Louisiana sixth graders in a school utilizing block scheduling compared to a middle school utilizing a traditional six, seven, or eight period day.

H2: There will be a statistically significant difference in the levels of math proficiency among Louisiana seventh graders in a school utilizing block scheduling compared to a middle school utilizing a traditional six, seven, or eight period day.

H3: There will be a statistically significant difference in the levels of math proficiency among Louisiana eighth graders in a school utilizing block scheduling compared to a middle school utilizing a traditional six, seven, or eight period day.

The following research hypotheses address research question two regarding Louisiana middle school students' performance at the mastery or advanced level on the mathematics portion of the state's yearly assessment, LEAP 2025, in the spring of 2018.

H4: There will be a statistically significant difference in the percent of sixth-grade students performing in the mastery or above range on the Louisiana yearly assessment in mathematics when those students attended a school utilizing a block schedule versus those students attending a middle school on a traditional six, seven, or eight period day.

H5: There will be a statistically significant difference in the percent of seventh-grade students performing in the mastery or above range on the Louisiana yearly assessment in mathematics when those students attended a school utilizing a block schedule versus those students attending a middle school on a traditional six, seven, or eight period day.

H6: There will be a statistically significant difference in the percent of eighth-grade students performing in the mastery or above range on the Louisiana yearly

assessment in mathematics when those students attended a school utilizing a block schedule versus those students attending a middle school on a traditional six, seven, or eight period day.

Assumptions and Limitations

The researcher assumes that school leaders view the middle school schedule as a tool to address the learning needs of students and impact student achievement. Also, the researcher places confidence in the assessment data collected from the Louisiana Department of Education as being valid and reliable with the understanding that one standardized test only provides a snapshot of student and school performance over a period of time. This study will analyze LEAP 2025 mathematics data for all sixth, seventh, and eighth-grade students participating in the assessment. Other aspects that have an impact on student and school success, such as attendance, instructional pedagogy, and student engagement will not be analyzed.

In addition, the scheduling data provided by each public middle school in the state of Louisiana is presumed accurate. Since broad information regarding the block and traditional schedule formats at the middle school level will be provided, comparisons among variations within each will not be included in the study. Another limitation of the study is the effect of teacher experience on the student achievement. The research will be examined as overall school averages as opposed to individual student success and teacher experience.

Definition of Terms

Block Schedule: A school scheduling model in which students attend fewer classes per day for longer periods of time (Williamson, 2009).

Every Student Succeeds Act (ESSA): The reauthorization of the federal No Child Left Behind Act that outlines the school accountability system to evaluate school quality, equity, and performance. The reauthorized law contains policies to guide educators and schools as they promote student success in college and future careers (U.S. Department of Education, 2017).

Interdisciplinary Teaming: An interdisciplinary team is a group of teachers who specialize in different subject areas working together to develop coordinated units of curriculum, instruction, and assessment for a common group of students (Alexander & George, 1993).

Louisiana Educational Assessment Program (LEAP 2025): The yearly statewide assessment system for Louisiana students in grades three through twelve to assess student progress toward Louisiana Student Standards (Louisiana Department of Education, 2017a).

Middle-Level Grades: Schools containing at least three consecutive grades of five, six, seven, or eight, but not grade levels four or nine (Alexander & George, 1993).

Middle School Concept: A philosophy of middle school education in which all components of practice are implemented as a whole, in order to meet the needs of young adolescents aged 10 to 15 both academically, emotionally, and socially (Dickinson, 2001).

School Schedule: The way in which the school day is organized and structured allowing for students to access the instructional program (Hackmann & Valentine, 1998).

Traditional Schedule: A school schedule with multiple periods of instruction per day – typically six, seven, or eight periods each with an equal amount of instructional time. Students move to various teachers to study different subjects each day (Hackmann et al., 2002).

CHAPTER 2

LITERATURE REVIEW

Introduction

Has middle-level education failed our students? When state, national, and international test scores did not reveal significant progress of middle-grade students in America, critics began to speculate about the philosophies and practices in our schools (Powell, 2015). However, Dickinson (2001), a proponent of the middle school, stated, "there is nothing wrong with the middle school concept" (p. 1). The author also reported that poor implementation of the middle school philosophies and practices led to struggling middle school students and schools. The middle school "is an organizational, curricular, instructional, and relational environment that cannot be parsed or broken" (Dickinson, 2001, p. 4).

This review of literature focuses on the importance of the organizational framework of middle schools in order to meet the needs of young adolescents and to realize the vision of the organization. As noted by the researchers, the middle school schedule could be a powerful tool for leaders to design and implement in order to create an environment reflective of values, vision, and student needs. One type of scheduling structure might not be effective for all schools. According to Powell (2015), middle school teacher and advocate, schools must evaluate the effectiveness of their current

schedule and possible future scheduling shifts on a regular basis because the variables constantly change.

Carolan and Chesky (2012) found that despite many criticisms during the second half of the 20th century, the number of stand-alone middle schools typically serving students in grades six, seven, and eight increased by 41% compared to the first half of the century. The researchers stated there was no consensus about which grade configuration served young adolescents the best, but reaffirmed the tenants of *This We Believe* in which organizational structures must foster purposeful learning and meaningful relationships for middle school students (Association for Middle Level Education, 2010). Thus, this study explored the framework for a successful middle school program, including a review of the middle school movement, current research on middle school success, and innovative and traditional organizational structures with school bell schedules. In order to understand the unique features and struggles of the American middle school, first, the history of the reform was reviewed.

History of Adolescent Education

Beane and Lipka (2006) emphasized the need for leaders in education to look beyond grade configurations and toward the real problems troubling middle schools. Identifying the characteristics of effective middle-level schools has always been challenging. In order to effectively create environments that foster middle school student growth and achievement in the future, a review of how young adolescents have been grouped and educated these past 100 years was paramount.

During the 19th century, students learned basic skills, received training in vocations, and traditionally attended two school levels from grades one to twelve

(Manning, 2000). According to Manning, the first level of schooling was an eight-year elementary program, and the second level was a four-year high school program. At the time, however, this type of school organization did not address the developmental needs of young adolescents. At the turn of the century, in an effort to address school reform and reduce the amount of time students spent at the elementary level, junior high schools educating students in grades seven to nine were created with the first one opening in 1909 in Ohio (Styron & Nyman, 2008). These researchers explained this school structure started the development of middle-level education, which focused on the unique needs of the young adolescent.

Fifty years later, in the mid-20th century, questions and skepticism surrounded the emerging junior high structure (Lee & Smith, 1993). Early advocates for the junior high configuration of grades seven to nine supported a program of study that offered challenging content, better teaching, and enrichment activities. However, researchers Lee and Smith (1993), found the comprehensive high school model for junior high schools "led to the alienation of a considerable number of students" (p. 166). As early as the 1960s, Vars (1965) stated many of the junior highs mimicked high school departmentalization of curriculum, a loss of guidance for students emerged, and a greater student to teacher ratio than originally desired occurred. In addition, junior high schools in the 1960s continued to follow rigid schedules and showed little effort in curriculum enrichment and integration among subject areas (Wavering, 1995).

The junior high movement was founded as an attempt to provide students a unique program of study to meet specific social, personal, and academic needs (Dickinson, 2001). Within two decades of the development of the junior high, educators

called for reform of the junior high because it did not evolve as intended. Alexander and George (1993) stated that over time many junior high organizational structures and practices such as academic credit, grading, instructional methods of teachers, student activities, and schedules mirrored the high schools. Unequivocally, the emergence of the junior high during this time period was the first type of middle-level school and part of the ongoing development of middle-level education (Manning, 2000).

Concerns about the junior high practices not effectively bridging the gap between childhood and adolescence led to discussions among policymakers and educators to consider a transformation of junior high education (Powell, 2015). Dr. William Alexander, known as the father of the middle school movement in the 1960s, proposed the name change from junior high to middle school (Schaefer et al., 2016). Alexander defined middle school as those years of schooling for students aged 10 to 15 that focused on relevant curriculum and developmentally appropriate instruction by specially trained educators (Association for Middle Level Education, 2010). As the framework for middle school education formed, James B. Covant, former president of 20 years at Harvard University, also urged school districts to create more comprehensive curriculum meeting the various needs of all students, including extra-curricular activities and more blocks of time for meaningful work (Coburn, 2015). In 1965, Superintendent Hull of Torrance County Schools in Los Angeles County, California, stated, “simple, uncomplex organizations give students better relations and better contacts and better understanding between student and teacher. This is what we should be working toward. This is where elementary education excels” (p. 215).

Following the explosive reform decade of the 1960s, the Association for Supervision and Curriculum Development (ASCD) published *The Middle Schools We Need* in 1975 (Gatewood & Dilg, 1975). The report acknowledged and emphasized the need for schools to be responsive to young adolescents aged 10 to 14 and develop programs that eased the transition from elementary to middle school, provided a rich curriculum, focused on appropriate instructional implementation, and offered student guidance (Gatewood & Dilg, 1975). Creating a climate supportive of team teaching, individualized instruction, flexible scheduling, and innovation were key points shared by the ASCD. Conant's recommendations in the 1960s centered on the structural framework of schools, which included scheduling, specifically flexible scheduling (Coburn, 2015). Vars (1965) reported that some junior high schools during the second half of the century utilized flexible scheduling through blocks of time that were allocated for interdisciplinary instruction. This flexible scheduling also enabled schools to create better guidance programs for students "lost in the shuffle."

There was a sincere effort to maintain elementary school features, such as fewer teachers and class changes. According to Vars (1965), a successful school for young adolescents combined traditional approaches of teaching the whole child as in elementary school with an emphasis on contextual, rigorous curriculum infused with problem-solving. This required specialized training for middle-level teachers and an intentional focus on creating an environment unique to the specific group of students being educated.

The development of the Middle School Concept began to take shape over the decades of the 1960s and 1970s (Dickinson, 2001). While Kindergarten to eighth-grade structured schools continued to exist, there were approximately 2,000 middle schools by

the 1970s (U.S. Department of Education, 2017). By the end of the 1990s, approximately 11,000 middle schools housed grades six to eight; thus, the number of junior high schools serving grades seven to nine declined by nearly half (U.S. Department of Education, 2017). The middle school existed as a name and as a grade organization (Gatewood & Dilg, 1975).

The Middle School Concept

According to Armstrong (2006), middle schools must provide an educational environment that allows early adolescents an opportunity to negotiate the physical and physiological changes of puberty. The characteristics of effective, responsive middle-level schools included (a) safe school climate, (b) small learning communities, (c) personal adult relationships, (d) engaged learning, (e) positive role models, (f) metacognitive strategies, (g) expressive art activities, (h) health and wellness focus, (i) emotionally meaningful curriculum, (j) student voice in decision making, and (k) facilitating emotional and social growth (Armstrong, 2006).

According to authors Beane and Lipka (2006), whether the school configuration was Kindergarten to eight, Kindergarten to six, six to eight, seven to eight/nine, nine to twelve, or any combination thereof, the primary goal was to educate young adolescents with their best interest in mind while guiding curriculum, instruction, assessment, and other program implementations. Armstrong (2006) stated that teens in sixth, seventh, and eighth grades who were simply relocated back to an elementary setting (i.e., Kindergarten to eighth school) still would not have had their developmental needs met. The middle school concept aimed at addressing the social as well as the academic needs of young adolescents while transitioning to high school (i.e., grades nine to twelve). The prior

research findings of Dickinson (2001) parallels Armstrong in that young adolescents were found to have significantly different needs than elementary and high school students. Young adolescents needed schools and classrooms to help them move through this developmental transition from elementary to high school.

Lee and Smith (1993) studied the effects of school restructuring on the achievement and engagement of middle-grade students. Their comparative research on restructured middle schools revealed modest positive effects in both the achievement level and engagement level of students. The restructuring reform included less departmentalization and more team teaching for middle-grade students. However, middle-grade schools included several grade bands, including Kindergarten to eight, Kindergarten to 12, six to eight, and seven to nine (Lee & Smith, 1993). The authors concluded that early adolescents thrived and performed better when their age group was not isolated, and the Kindergarten to eight structure was more personal and beneficial overall.

In 1985, the National Association of Secondary School Principals (NASSP) released *"An Agenda for Excellence at the Middle Level*" that focused on a school's mindset to be student-centered and build programs responsive to student needs (Mertens, Anfara et al., 2007). One dimension of the student-centered mindset was the area of school organization. The researchers stated, in an effort for middle schools to be academically successful, teachers and students should have more control over decisions about curriculum, instruction, assessment, and the overall learning environment. The report provided the following claims as to how a school would achieve academic success (a) school decisions made at the lowest level, (b) large schools divided into smaller units

or teams, (c) class schedules provided uninterrupted instruction time, and (d) the creation of advisory groups.

Based on the research of the National Association of Secondary School Principals (1985), the National Middle School Association (1995), and the Carnegie Council on Adolescent Development (1989), the overall framework for middle school education became clear. Emphasis was placed on the organizational structures and the presence of unique middle school elements necessary for effective teaching and student success. Middle school research and reform continued through the end of the 20th century. The theories outlining successful middle school structure and organization through varied implementation were examined, literature about the middle school movement increased, and the middle school concept took shape.

In 1982, the National Middle School Association's vision statement, *This We Believe*, was first published (Mertens, Flowers, Hesson-McInnis, & Bishop, 2007). The vision statement included multiple characteristics for a successful middle school. Revisions to *This We Believe* included Turning Points: Preparing American Youth for the 21st Century, a report published in 1989, that recommended team teaching, common planning time, and other organizational structures as the foundation for a successful middle school (Schaefer et al., 2016). Further clarification of the National Middle School Association's vision came in 1995 with the publication of *This We Believe: Developmentally Responsive Middle Level Schools*. The belief statements included the presence of a shared vision of excellence, a commitment by educators to provide a challenging instructional program in a supportive environment, flexible organizational

structures, and programs focused on the needs of young adolescents in order for success to take place at the middle level (Mertens, Anfara et al., 2007).

Transforming the education of young adolescents would have a large impact on improvements to academic and personal outcomes for all youth (Carnegie Council on Adolescent Development, 1989). In their publication, *Turning Points: Preparing American Youth for the 21st Century*, the Task Force on Education and Young Adolescents identified a lack of consistency between the internal organization of middle grades and the associated instructional program. The shift from a primarily small environment to a more impersonal, larger school environment at the middle-level increased barriers to strong, supportive relationships with peers and adults. These findings by the task force supported the National Middle School Association's vision for middle school education when the group stated in *This We Believe* "the ways schools organize teachers and group and schedule students have a significant impact on the learning environment…The team is the foundation for a strong learning community characterized by a sense of family" (p. 31). It was clear that, during a time of rapid emotional, physical, and social development, young adolescents needed more guidance to help cope with all the changes associated with puberty (Carnegie Council on Adolescent Development, 1989).

According to Dickinson (2001), the concept of the middle school was to bridge the gap between a self-contained learning environment at the elementary level and a departmentalized environment at the high school level. Components of the middle school concept included small teaching teams, an integrated curriculum, service learning, and mentorship. Simply putting different combinations of consecutive middle-grade levels

together without the implementation of the middle school concept will not achieve student and school success. The middle school concept must be implemented as a complete set and with fidelity over time in order for student success to be possible (Beane & Lipka, 2006).

Improving academic achievement for all students was a goal of many school leaders and the driving force behind the middle school concept. According to Beane and Lipka (2006), the elements of the middle school concept included (a) understand young adolescents, (b) provide challenging and integrative curriculum, (c) create supportive and safe environments through small teaching teams, (d) ensure better teacher preparation for middle grades, and (e) improve relationships with families and communities. All of the researchers, middle school advocates, and associations discussed here have demonstrated agreement on the type of middle school program young adolescents need to be offered (Armstrong, 2006; Association for Middle Level Education, 2010; Beane & Lipka, 2006; Carnegie Council on Adolescent Development, 1989; Dickinson, 2001; Lee & Smith, 1993). Lastly, the Association for Middle Level Education (2010) believed that providing an educational program to young adolescents that is responsive, challenging, empowering, and equitable requires schools to analyze the cultural and structural components of the school as well as curriculum, instruction, assessment.

School Culture and Environment

According to Ali and Heck (2012), many studies of middle-level schooling pointed to school values, personnel, and school leadership as strong determining factors for student achievement. In support of these factors, Fisher, Frey, and Pumpian (2012), included relationships, identity, culture, and data as necessary components to anchor and sustain a school. Building a school culture of achievement at any level is possible when school cultures and academic focus, responsibility, intensity, and urgency are integrated and aligned (Fisher et al., 2012).

Fisher et al. (2012) developed practices and structures to help schools get into a cycle of improvement, which is driven by mission, inspired by vision, and operationalized by culture. The authors believed a school's culture should not be hidden but uncovered and purposely discussed, developed, lived, and assessed. Support for these beliefs was also shown through the works and core ideas of Bambrick-Santoyo (2012), who stated school culture is not formed by motivational speeches or statements of values. The author stated school culture is formed by repeated practice – using every minute of every day to build good habits. Fisher et al. (2012), and Bambrick-Santoyo (2012) all identified that structuring the culture of a school with quality as a focus leads to increased student and school achievement.

Powell (2015) reported on the effects of structuring people, time, and place in middle-level classrooms on the overall climate and success of middle schools. The author continued to promote that the middle-level teacher-student team is the optimal people structure. In addition, the structure of people in a school organization was clearly supported by Fisher et al. (2012), who emphasized that student achievement and school

success increased when structures were in place to support the mission and vision of the school.

Through their work, Fisher et al. (2012) identified the following five pillars, or structures, that lie above the surface of a school organization and expose the culture which lies below. The five pillars were (a) a welcoming environment, (b) safety, (c) collaboration and communication, (d) additional time and support, and (e) positive teacher efficacy. First, the authors asked, "if students do not feel welcome, then how can we expect them to participate, engage, and achieve at school?" (p. 17). Immersing students into a welcoming culture had a strong impact on the climate and success of a school. Powell's (2015) experience in the middle school classroom reflected this welcoming structure. The author described the middle school classroom as an environment that says to students, "Welcome. This is a place where you are wanted" (p. 135). Second, Fisher et al. (2012) identified a strong relationship between safe schools (physical safety and emotional safety) and student achievement. Next, for students to develop positive identities, communication between students and their teachers needed to be positive and foster a growth mindset. For example, teachers must attribute accomplishments about academic successes to the students, include students in collaboration, and tell them they are valued. The power of the language teachers use with students can mean the difference between a focus on achievement or an emphasis on maintaining order.

The fourth pillar holds learning constant, not time (Fisher et al., 2012). When the belief in the school is that all children can learn, then competence takes a front seat to compliance. Competence is the belief a person has the ability to do something. Giving

students additional opportunities to receive support to learn content and demonstrate understanding for academic recovery purposes allows the students to take ownership of improvement efforts and set goals. Although Powell (2015) viewed time as a constant, how time was organized for students was an important responsibility and structure so students can benefit.

Finally, according to Fisher et al. (2012), strong teacher efficacy included the belief that he or she has the capacity to affect student performance and, thus, had an impact on creating the best school in the universe. This fifth pillar is an internal accountability measure. Pride and ownership of student successes lead to increased engagement and performance. Working toward being the best included building and maintaining a school culture, while student achievement was continuously monitored.

According to Dickinson (2001), middle-level reform advocates recognized the dramatic changes in the social and physical development of young adolescents and called for educators to play an important role in advisory programs for the youth. Dickinson went on to state that there was a call to blend the elementary-like environment with the more disciplined approach of secondary schools. Essentially, the goal was to create a school within a school in order to meet the needs of young adolescents. Thus, as Powell (2015) discussed in her work, teams of teachers would share in the planning, execution, and achievement of educational goals for the same group of students. As Dickinson (2001) and Powell (2015) both pointed out, successful middle school reform efforts grew out of the complete integration of structure, culture, and climate.

This integration of structure, culture, and climate was also supported by DuFour and Fullan (2013), who asserted that the best hope for sustained and substantive school

improvement was to develop the capacity of educators to function as members of a professional learning community (PLC). They emphasized that this type of school improvement process included an innovative, cultural change. Fullan field-tested a reform initiative in Ontario focusing on learning, capacity building, use of data, and fostering leadership at all levels. This school and system improvement effort led to a gain in high school graduation rates from 68% to 82% and substantial increases in literacy learning in nearly 4000 elementary schools. Ontario's province-wide reform included the implementation of true professional learning communities (Fullan, 2013).

According to DuFour and Fullan (2013), professional learning communities are about people, processes, and practices and fundamentally a change in school culture. As experts in education reform, DuFour and Fullan identified six characteristics of high performing professional learning communities. These characteristics include: (a) shared mission, vision, values, and goals all focused on student learning; (b) a collaborative culture with a focus on learning; (c) collective inquiry into best practice and current reality; (d) action orientation or "learning by doing"; (e) a commitment to continuous improvement; and (f) a results orientation.

In his study of leadership, Bambrick-Santoyo (2012) explained that school leaders who are responsible for consistent, transformational, and replicable growth in their schools must focus on seven core areas of school leadership. The author explained these core areas are called "levers." By focusing on these core areas, leaders are able to leverage considerably more student learning. Of the seven levers, two are the fundamental foundation for a school's success. These "super-levers" are data-driven

instruction and student culture. These two levers help determine a school's instructional capacity.

As stated previously, DuFour and Fullan (2013) were strong advocates working to find ways to increase a school's instructional capacity. They also noted that the formation and implementation of professional learning communities were vital to increasing the instructional capacity. As DuFour and Fullan (2013) and Powell (2015) described in their research, professional learning communities evolve around the structures of time, place, and people. In any organizational structure, Powell (2015) stated, "teaming is as powerful as the people involved…the structure provides the opportunity" (p. 114). Student and school culture reform recognized that focusing on human development was paramount to successful middle school experiences for young teens (Armstrong, 2006). In schools with strong cultures, students received a continual message that nothing is as important, or as engaging, as learning (Bambrick-Santoyo, 2012).

School Organization and Reform

According to Armstrong (2006), practices supporting a successful middle school culture included positive, adult role models, overall healthy and safe school environments, collaborative decision-making among all school stakeholders including students, small learning communities, and engaging, authentic learning experiences for students. As a comprehensive package, these practices had a positive impact on student success in the middle grades. How do schools afford school stakeholders the opportunity to be part of these successful, transformational education practices, and does the organization of the school day play a part? This study was aimed at finding out.

In a study conducted by Mattox et al. (2005), middle school teachers in five different schools stated student learning in their mathematics' classrooms was enhanced as a result of a culture shift and scheduling reform. The schools represented in the researchers' study moved from a traditional bell schedule to block scheduling, which allowed teachers and students extended periods of time for learning. During this transition to block scheduling, no other significant changes were implemented at the schools. The researchers noted teachers were able to incorporate more cooperative and authentic learning experiences into the daily lessons, which are characteristics of block scheduling and had a strong impact on instructional capacity. This study revealed a significant upward trend in sixth-grade students' math achievement over a course of three years following the implementation of block scheduling at all five schools. The effect sizes were statistically significant at the 0.35, 0.46, 0.45, 0.73, and 0.51 levels during year two and three of block scheduling implementation at the respective schools.

As indicated previously by Fisher et al. (2012), schools must hold learning constant, not time. In the 1983 national report, *A Nation at Risk: The Imperative for Education Reform*, one key recommendation addressed the utilization of instructional time in our nation's schools in an effort to prioritize learning (National Commission on Excellence in Education, 1983). In support of the national report, research conducted by the National Education Commission on Time and Learning led to the publication of *Prisoners of Time* in 1994. This report emphasized the need for schools to reorganize bell schedules to dedicate more uninterrupted time for learning and professional development for teachers and to eliminate the traditional seven-period day. The National Education Commission called for extended periods of learning in an effort to promote collaboration

and differentiated learning activities. Time should be leveraged to optimize student learning (National Education Commission on Time and Learning, 1994). During the last decade of the 20th century, traditional and block scheduling received a great deal of attention by school districts across the country at all levels of education, with a major focus at middle school and high school levels.

After noticing significant differences in academic proficiency at two very similar middle schools in terms of demographics, teacher efficacy, and administrative support, Fisher and Frey (2007) supplemented their middle school research by spending time with two students, one from each of the two middle schools, but operating on very different schedules. Within the same span of three years, one school dropped 7.5% in overall academic proficiency and the other gained 16.9%. The school that experienced a drop in academic proficiency operated on a traditional, seven-period day, and the school that improved operated on a block schedule. The school that utilized the block schedule also organized students into smaller cohorts or teams. This type of structure supported Dickinson's (2001) school within a school concept to meet the needs of young adolescents and clearly had an impact on the success of the school gaining in achievement, as noted by Fisher and Frey (2007). In addition, the more successful school in this study provided additional opportunities for learning after regular school hours for students. This additional time and support clearly aligned with Fisher et al. (2012) structure of holding learning constant. The study associated with these two schools demonstrated to Fisher and Frey (2007) that the use of time in middle school matters.

Conversely, Gould (2003), an associate researcher in the Center on Education and Work at the University of Wisconsin-Madison, stated school schedules do not play a

significant role in student achievement. Gould was a researcher on The Wisconsin Project, which studied the effects of school schedules on student achievement, grade point averages, attendance rates, and discipline referrals. The data collected over the three-year study revealed no significant differences in student achievement between traditional and block scheduling. Gould continued to stress the importance of quality classroom instruction as a critical factor in student success as opposed to extended periods of learning called for by the National Education Commission on Time and Learning (1994).

The National Middle School Association's updated report, *Turning Points 2000,* continued to emphasize the need for schools to effectively meet the needs of young adolescents and ensure success for all students (Powell, 2015). According to the report, teams of teachers must have the power to arrange the time allotted for the school day to meet the needs of the students within the existing curricular framework (Powell, 2015). The report affirmed that the elements of the middle school concept, coupled with strong, effective scheduling practices, must be present and implemented with a high degree of fidelity for students and schools to succeed. Publication of *Turning Points 2000* followed a study conducted by the Southern Regional Education Board of middle schools between the years of 1997 and 1999, which revealed a weak correlation between educational practices and the needs of middle school students (Heller, Calderon, & Medrich, 2003). The Southern Regional Education Board denounced middle schools as the weak link in the Kindergarten to grade 12 continuum. Thus, continued discussion about the proper implementation of the middle school concept centered on how to meet the goals of implementation in an effective and efficient manner (Juvonen, Le, Kaganoff, Augustine,

& Constant, 2004). Scheduling is the mechanism to facilitate the school's vision and goals and address all areas of curriculum, instruction, and needs of students.

Middle School Scheduling Practices

In addition to the teachers being part of a cohesive team, students need to be part of a team when transitioning from one level of education to the next. Erb (2006) concluded the effect of grade-level transitions on student performance would happen either earlier or later, depending on if the transition was after attending a Kindergarten through eighth-grade school or attending a sixth to eighth-grade school. According to research conducted by Dhuey (2013), the actual transition to a new school, regardless of grade configuration, had the potential to negatively impact student performance and attitude toward school. Therefore, whether the transition takes place after fifth grade or after sixth grade, school leaders need to get to know their students' needs very quickly, provide challenging and integrative curriculum, ensure better teacher preparation, and create supportive environments through structures like teaching teams (Beane & Lipka, 2006). Erb (2006) also stressed the need for strong school leadership as young adolescents transitioned to middle school, regardless of whether the transition occurs after fifth, sixth, seventh, or eighth grade.

School leadership and the culture of the school will either support the middle school concept or will be responsible for failing to implement the concept successfully (Dickinson, 2001). Based on a compilation of research by Dickinson (2001), middle school advocates agreed that the middle school concept was an organizational, curricular, instructional, and relational environment. Beane and Lipka (2006) further stated in their research that school leaders and teachers need to create a culture for the middle school

model, develop an action plan for implementation, and embrace a continuous cycle of evaluation and improvement in order to create a learning atmosphere of growth and success. As identified by the researchers and practitioners in the field, successful implementation of the middle school concept required a complete change in school culture. Also, attention to the school schedule would set the stage for this positive reform.

The Carnegie Council on Adolescent Development (1989) supported a strong middle school culture stating middle school leaders, faculty, and staff need a school environment and structure that is responsive to the needs of young adolescents as well as the curriculum, instructional practices, assessment, and professional development. The council suggested schools maximize instructional time, prioritize common planning among teachers, foster the important relationships with middle school students, and develop an effective schedule. Accordingly, the schedule sets the tone for the learning environment, and careful consideration must be given to the needs of the students, the teachers who serve the students, and the overall vision for school success.

A middle school schedule can either facilitate or stifle a strong instructional program (Lee & Smith, 1993). These researchers discussed that how a school functions will be dependent on the social and organizational structure. For example, a school's social structure refers to all the interconnected relationships within the faculty, staff, and students, while the organizational structure refers to the routines, time management, and other procedures that inform the instructional program.

An effective middle school structure is dependent on many characteristics of the middle school concept and those implementing the instructional program. In 2010, the Association for Middle Level Education stated:

> The way schools organize teachers and group and schedule students has a significant impact on the learning environment. The interdisciplinary team of two or more teachers working with a common group of students in a block of time is the signature component of high-performing schools, literally the heart of the school from which other desirable programs and experiences evolve. (p. 31)

Armstrong (2006) quoted the dean of the School of Education at Georgia College and State University, who stated, "humans need meaningful relationships, particularly when they are in major developmental periods" (p. 124). Organizing the middle school day so students can develop positive adult relationships was critical, and shuttling students every 42 minutes does not support this component of the middle school concept (Dickinson, 2001).

Dissertation research conducted by Coburn (2015) revealed an analysis of school structure and implementation of positive change resulted in an increase in school and student success. There is no ideal middle school schedule because of all the factors involved in developing and putting into practice a strong instructional program. School size, teacher qualifications, school philosophy, district requirements, cost of school operations, and many other factors have an impact on school structure (Coburn, 2015). Many school districts may mandate specific middle school schedules due to funding and available resources. Despite these obstacles, Canady and Rettig (1995) strongly believed that scheduling could serve as a catalyst for school improvement.

Middle-grade configurations more closely aligned, such as sixth grade to eighth grade rather than a broader range of grades (i.e., seven to twelve), were more likely to experience successful school-wide reform because of supportive middle school practices (Schmitt, 2004). Middle schools housing grades six to eight, at a minimum, had a greater opportunity to build strong and lasting relationships with students and their families

simply due to the longer length of time spent within the grade configuration. In order for a school to be developmentally responsive, Dickinson (2001) stated all the working parts of school organization, administration, and teaching must collaborate and be cohesive. He said schools must strive for integrative teaching and professional learning communities. In addition, Dickinson (2001) reported that middle schools with a true implementation of the middle school concept must be flexible. While at times, more emphasis may be placed on one area to focus on school improvement or address the needs of the students, all areas are crucial to school and student success.

Many middle school schedules have been developed over the last few decades and for various reasons. According to Hackmann and Valentine (1998), the majority of school schedules fall into one of three main categories (a) the traditional departmentalized schedule, (b) the block schedule, and (c) the flexible interdisciplinary block schedule. To further complicate the concept of scheduling, there are many variations of the traditional and block schedules, and school leaders are challenged to find the best way to organize the school day to foster student growth and achievement. Hackmann (2004), believed the instructional practice must drive the structure of the school schedule. For example, block scheduling should be adopted to facilitate a specific instructional approach.

Traditional Scheduling

Research conducted by Roberts (2016) revealed most schools operate on a traditional bell schedule utilizing the seven-period day with approximately 50 minutes per period. The traditional departmentalized school schedule features equal amounts of instructional time for each core subject, including student-selected courses. The traditional schedule follows a more departmentalized structure and typically utilizes

ability grouping practices (Canady & Rettig, 1995). According to a national survey conducted in 1993 (Hackmann & Valentine, 1998), 94% of middle schools utilized six, seven, or eight period days. Utilization of this type of school schedule requires students to move to a different teacher and/or a different course every 45 to 55 minutes on the average.

An advantage to the traditional schedule is the shorter length of the class period, which can be more conducive to the brief attention span of the young adolescent (Roberts, 2016). However, a disadvantage of traditional scheduling discovered by Roberts (2016) in his research was the number of students a single teacher instructed on a daily basis. Depending on class size, teachers interacted with up to 175 students per day. In addition, the short period of time per class limited the implementation of hands-on and cooperative learning activities. Thus, the creation of more personal, student-centered learning environments was greatly reduced. According to Canady and Rettig (1995), exposing students to less personalized, interactive, and engaged classrooms conflicted with the Association for Middle Level Education's vision of the supportive connection between teachers and students. In order to address these concerns and to allow high school students to take more courses for credit in a given year, the block schedule gained in popularity in the 1980s and 1990s primarily at the high school level (Canady & Rettig, 1995).

Block Scheduling

An alternative to the traditional schedule is the block schedule, which is characterized by longer instructional periods and fewer classes per day (Williamson, 2009). Canady and Rettig (1995) noted that with fewer classes per day, the number of

transitions decreases along with a reduction in the number of discipline issues. The length of the class periods on a block schedule is approximately 80 to 90 minutes each. However, classes may or may not meet every day of the week. If a school offers the traditional number of classes (i.e., seven or eight) on a traditional full academic year calendar, then the alternate day block creates longer periods for instruction every other day. Thus, students have fewer transitions each day and classes alternate meeting days with longer periods of time per subject. Many variations of this schedule exist, including allowing for a weekly anchor day in which students would attend all classes for a shorter period of time (Hackmann & Valentine, 1998).

A potential advantage of block scheduling is to increase student-centered activities with the longer class times. Hackmann (2004) asserted that block scheduling, or any change in school scheduling, should be considered as a comprehensive reform package. He continued to stress how essential the school schedule should be to support student-centered instructional practices already in place. According to Hackmann (2004), the schedule does not inform the end but the means to the end, and in this case, the end is school improvement and student achievement.

In a mixed-methods study conducted by Biesinger, Crippen, and Muis (2008), the high school use of an alternating day, full-year block schedule in a large urban district was examined. These researchers wanted to determine if teaching pedagogy had changed and improved on the new schedule in 13 of 35 high schools. Classroom observations, student interviews, and teacher interviews revealed instructional strategies that were traditional in nature with limited student-centered approaches to learning. Eighteen percent of students in the alternative block schools did not acknowledge their teachers

varied activities as compared to prior years of schooling on traditional schedules. In addition, the majority of students did not feel as though stronger student-teacher relationships formed during the longer blocks of classroom time. Even though the study by Biesinger et al. (2008) focused on high school students, the lack of engagement and relationship building described was contrary to the *This We Believe* vision for middle school students (Association for Middle Level Education, 2010). The vision was centered around strong, supportive relationships with peers and adults, so a significant impact on the learning environment could occur.

An advantage of block scheduling from a middle school teacher's perspective would be fewer students on his or her roster in order to establish stronger relationships with their students, coupled with the larger block of time to allow for more student engagement in learning activities (Roberts, 2016). According to Armstrong (2006), the needs of the elementary and the high school students do differ from middle school age students because of the transition in schooling. Also, in *This We Believe*, the National Middle School Association highlighted the problems associated with implementing a high school form of block scheduling. The association stated it would be impossible to design and implement interdisciplinary units of study at the high school level (National Middle School Association, 1995).

Block scheduling was a popular movement in high schools in the 1980s and 1990s (Canady & Rettig, 1995). Since the national shift to Common Core State Standards (CCSS) in 2010, Roberts (2016) acknowledged few studies on the impact of block scheduling had been completed. His doctoral study, *Relationship of block scheduling to student achievement and learning activities*, was two-fold in nature (a) compare

achievement results of Pennsylvania high school students attending schools either utilizing the block or the traditional schedule and (b) report on the rigor level of instruction in each type of schedule. The researcher's specific research question relative to this study addressed how school mean performances compared on the Pennsylvania statewide standardized exams of Algebra I, biology, and literature. The data gathered by Roberts (2016) indicated no significant difference in the mean scores on any of the subject area assessments for students in a traditional or block schedule setting.

The literature on the impact of traditional and block scheduling on student achievement at the high school or middle school level was limited to studies showing little significance except with subgroups of students. Coburn's (2015) study of the impact of middle school scheduling on student achievement in math and science in Texas middle schools revealed no significant differences except in minority subgroup populations. Results indicated that schools with high minority student populations and experienced faculties performed better in both math and science when those schools utilized block scheduling. Gill and Wallecia (2011), had similar results in math and reading with subgroups of students in Virginia middle schools on a block schedule, specifically black and Hispanic students, outperformed their peers who followed a traditional middle school schedule. Both researchers concluded that the longer periods of time for learning on the block schedule met the needs of the subgroups experiencing success on the block schedules.

In contrast to Coburn (2015) and Gill and Wallecia (2011), the research of Mattox et al. (2005) revealed significant increases in the math achievement of sixth graders enrolled in North Carolina middle schools when those schools transitioned to block

scheduling. The effect sizes were statistically significant at the 0.35, 0.46, 0.45, 0.73, and 0.51 levels of performance at each of the five schools in the study. Sixth-grade mathematics performance was analyzed over the course of a three-year period. The researchers concluded the positive outcomes could be attributed to the characteristics of block scheduling. These results aligned with the transition research from elementary to middle school and the needs of young adolescents. In addition, the three years of analysis of math achievement allowed for instructional practices on the block schedule to improve; thus, this evidence seems to support Hackmann's (2004) claims of practice driving structure. In order for teacher pedagogy to influence scheduling, then research on the interdisciplinary-flexible schedule should be reviewed as this structure pairs well with the tenants of the middle school concept.

Interdisciplinary-Flexible Block Scheduling

Another variation of the block schedule is the interdisciplinary-flexible block schedule. The flexible block schedule is often associated with middle schools and establishes longer blocks of instructional time for teaching teams (Hackmann & Valentine, 1998). The primary purpose of the flexible block is to meet the needs of the students, empower teacher teams to utilize the blocks of time, and to support interdisciplinary, integrated activities (Williamson, 2009). Teams of teachers partner to share students, space, curricular units, and a philosophy unique to middle schools (Powell, 2015).

According to Hackmann and Valentine (1998), research studies comparing student achievement in various scheduling environments indicated the flexible, interdisciplinary block schedule to be more favorable for student success. Middle-level

schools, whether grades six to eight or grades seven to eight, can be successful when they take advantage of interdisciplinary teaming, instruction, and assessment. A study completed by Hackmann and Valentine (1998) demonstrated the interdisciplinary, flexible schedule appeared to be the most effective in supporting the instructional program along with the components of the middle school concept, as shown in Table 2.

Table 2

Types of Schedules Compared Against Scheduling Criteria

Scheduling Criteria	Traditional Departmentalized Schedule	Alternating-Day Block Schedule	Interdisciplinary Flexible Block Schedule
Team organization	0	2	3
Appropriate curriculum content	2	2	3
Quality instruction in the disciplines through expanded time	2	3	3
Child-centered instruction	1	2	3
Teacher collaboration time	1	2	2
Teacher empowerment	1	2	2
Total Score	7	13	16

The study completed by Hackmann and Valentine (1998) compared various scheduling options and the effectiveness in which each type of schedule addressed six key components of a student-centered middle school program (a) team organization, (b) appropriate curriculum content, (c) quality instruction in the disciplines through expanded time, (d) child-centered instruction, (e) teacher collaboration time, and (f) teacher empowerment. Each scheduling option was rated on a scale of zero to three with a rating of zero indicated no support, a rating of one indicated low support, a rating of two indicated medium support, and a rating of three indicated a high level of support for

the schedule criteria. The ratings were based on years of research of the individual criterion, and a final total score was tabulated.

A possible advantage of the flexible, interdisciplinary block schedule is that it allows schools the opportunities to address all the aspects of the middle school concept. Schools with grades six to eight were about 20% more likely to utilize teaming compared to junior high schools housing grades seven to nine (Hackmann et al., 2002). Implementation of the flexible, interdisciplinary block schedule will allow middle schools to implement the middle school concept with fidelity to improve student achievement. As Erb (2006) noted, implementing the middle school concept requires many components, including interdisciplinary teams of teachers, students, and school leaders.

One goal of the interdisciplinary block schedule is to provide more instructional minutes in the core areas of math, reading, science, and social studies (Hackmann & Valentine, 1998). Middle schools including grades six to eight have the ability to dedicate more time to interdisciplinary teaching and to better meet the needs of their students as the school structure would allow. On the other hand, junior high schools (i.e., grades seven to eight) mimic ninth to twelfth grade high schools more often; thus, more departmentalization exists with subject areas. Departmentalized schedules often found in junior high schools and high schools create barriers to integrated instruction and teaming. As stated by Canady and Rettig (1995), “students traveling through a six, seven, or eight period day encounter the same number of pieces of unconnected curriculum each day with little opportunity for in-depth study” (p. 4).

Any variation of the block scheduling practice promotes an increase in quality instructional minutes, which may have an impact on student performance. Roberts (2016) found longer periods of instructional time allowed the teacher and teams of teachers' time to plan and deliver quality, in-depth lessons. Specifically, the interdisciplinary-flexible block schedule allowed teams of teachers representing each subject area and teaching the same students common planning time to discuss students and instruction (Warren & Payne, 1997). A lack of teaming will not support the strong relationship building practices often found in Kindergarten to grade eight or grade six to grade eight schools (Hackmann et al., 2002).

Professional development on how to effectively utilize the extended instructional time on the block schedule is necessary (Roberts, 2016). The researcher contends that teams of teachers must examine their classroom practices to ensure instructional methods promote active student learning. Therefore, increased professional development was both an advantage and an opportunity for the success of the middle school concept. Proponents of block scheduling believed the additional time allowed for teachers to design more engaging and rigorous lessons (Roberts, 2016). In addition, schools incorporating a team approach to planning and instruction, along with high levels of professional development, could witness improved student performance. However, Roberts' (2016) review of literature revealed little evidence showing differences in the way teachers implemented instruction on a traditional schedule compared to the block schedule. As stated earlier, Hackmann (2004) insisted instructional practices should drive the structure of the schedule. "Constructivist principles should be the driving force behind any decision to implement block scheduling" (Hackmann, 2004, p. 702).

There has been minimal research conducted on the impact teacher professional development has had on middle grades' student achievement. With the goal of professional development focused on improving student achievement, it was surprising that only 4% of research on adolescent academic achievement was experimental in design (Schmitt, 2004). In order to sustain professional development and ultimately, teacher growth, a culture of ongoing, systemic, site-based, and job-embedded professional development was necessary. This is where the flexible, interdisciplinary block schedule favors the traditional schedule because of the extended time for common planning and opportunities for professional development.

According to Hackmann and Valentine (1998), a school schedule should promote quality teacher collaboration. The main benefit of block scheduling and the teaming of teachers is the provision of common planning time so teachers can work collaboratively to establish curriculum and effectively design instruction. In addition, the schedule should promote teacher empowerment (Hackmann & Valentine, 1998). The researchers stated teacher efficiency would be improved through teaming and allowing teachers the autonomy to make instructional decisions based on the needs of their shared students. Similarly, DuFour and Fullan (2013) supported teacher empowerment but also stated while school organization is important, the human resources (i.e., teachers and administrators) within the organization are key ingredients for success. They acknowledge that a community of talented teachers, led by administrators who involve them in decision-making, encourage them to work together as a collaborative team, and motivate them to reach high expectations will impact student performance.

Principals or school directors are instructional leaders who lead by example, collaborate with their team, and set the tone or climate for success (Bambrick-Santoyo, 2012). As stated by Bambrick-Santoyo (2012), the school leader can create a healthy environment where the middle school concept will flourish. Energy and synergy are important characteristics of a school team to promote learning. A principal can set the stage in their school building for positive reform and improvement, whatever the grade configuration. For example, the principal can establish interdisciplinary teams, preserve time in the school day for teams to collaborate (i.e., professional learning communities), offer sustained and meaningful professional development, and foster strong relationships with students and their families. This type of student-centered approach to teaching and learning requires extended blocks of time; thus, modifying the schedule to fit the learning is pivotal (Roberts, 2016).

Lastly, Hackmann and Valentine (1998) identified several factors critical in determining the best scheduling structure at the middle school level and are linked closely to the elements of the middle school concept. In order to structure the school day and meet the organization's goals, the school schedule must (a) support interdisciplinary teaming, (b) support curriculum, (c) utilize expanded and flexible uses of time, (d) embrace supportive student relationships, (e) promote teacher collaboration, and (f) promote teacher empowerment. It is clear the elements of the middle school concept must be implemented in a comprehensive manner for school success and student achievement to be reached (Beane & Lipka, 2006; Dickinson, 2001; Hackmann & Valentine, 1998; Roney et al., 2008).

School Accountability

The intent of accountability systems in education was to improve student, school, and district performance (Betebenner & Linn, 2010). In an effort to increase accountability among school systems, the United States federal government reauthorized the Elementary and Secondary Education Act as the No Child Left Behind Act of 2002 (Klein, 2015). Federal legislators emphasized high academic standards, improved education for all students, and the need to close the achievement gap among student groups. Under the revised law, all students were to show proficiency in the academic areas of math and reading by the year 2014 (Klein, 2015). The efforts of school systems to meet the proficiency requirements of the No Child Left Behind Act fell short, and the achievement gaps between groups of students widened. The United States Department of Education released reports in 2008 outlining 25 years of minimal improvement in student achievement (U.S. Department of Education, 2008). The department also noted the national education system was at even greater risk of failure in 2008 than when compared to 1998 (U.S. Department of Education, 2008).

According to Armstrong (2006), the No Child Left Behind Act negatively impacted the implementation of the middle school philosophy. The number of middle schools identified as "needing improvement" under the new law nearly doubled within two years. Armstrong, a published educator in support of student learning and human development, quoted a California middle school principal who said, "the big issue is NCLB doesn't take into account the unique needs of middle schools" (Armstrong, 2006).

Continued reports of stagnant or declining student achievement over the 20th and 21st Centuries in the United States led to reform efforts. Passed by Congress in 2015, the

Every Student Succeeds Act (ESSA) was the new federal law requiring states to articulate and implement a cohesive plan for measuring student achievement of content standards, reporting information to parents and the public, supporting students in making academic progress, and spending federal funds (Klein, 2015). On July 1, 2017, ESSA officially replaced the No Child Left Behind Act as America's federal education law (Klein, 2015). ESSA was largely focused on the needs of historically disadvantaged students, including students from low-income homes, students whose first language is not English, and students with disabilities (Klein, 2015). The belief in Louisiana was that all students have the capacity to learn as any in America, and all students must be provided equal access and opportunity to high-quality teaching and learning (Louisiana Department of Education, 2018).

With the changes in federal education laws, there was a greater emphasis on academic standards than ever before. In accordance with the National Governors Association Center for Best Practices and Council of Chief State School Officers' recommendations, the Every Student Succeeds Act of 2015 propelled states to adopt new, higher academic standards called the Common Core State Standards (Klein, 2015). This initiative led states to develop their own set of standards and rigorous curriculum based on the core standards (Klein, 2015).

As of 2015, 42 states, including Louisiana, had adopted the Common Core State Standards as their foundation for written and assessed curriculum (Berner, 2016). Louisiana's state laws require that standards be rigorous and prepare students for college and the workplace (Louisiana Department of Education, 2018). By 2017, Louisiana defined academic standards in seven subjects, including English Language Arts (i.e.,

reading and writing), math, science, social studies, foreign languages, physical education, and health (Louisiana Department of Education, 2017a). Student and school success depend on many factors, including the curriculum (i.e., written, taught, and tested), school organization, and functionality of the school.

In addition to higher academic standards, the Every Student Succeeds Act (ESSA) of 2015, which is the reauthorization of the No Child Left Behind Act of 2001, required states to maintain accountability systems that evaluates school quality and performance of all students (Klein, 2015). The legislation required states to develop comprehensive accountability plans and place emphasis on struggling schools. The current federal mandates, however, provide states the flexibility to establish system goals, develop state-specific accountability systems, and create support systems for underperforming subgroups of students and schools based on state measures of success (Klein, 2015).

Standardized assessment data is widely used by states to track student performance and student growth. In addition, assessment data is analyzed to determine the quality of the local and national education systems (Betebenner & Linn, 2010). Numerous metrics are used to report student achievement at one point in time as well as growth over a period of time. For example, ordinal performance levels are used for criterion-referenced assessments, such as below basic, basic, proficient, and advanced. The associated scale scores are often compared year-to-year to determine individual student growth.

In the state of Louisiana, every public school participates in a school accountability system based on student achievement (Louisiana Department of Education, 2018). The Louisiana Educational Assessment Program (LEAP 2025)

includes criterion-referenced tests in English Language Arts (ELA), mathematics, science, and social studies in grades three to twelve. The assessments measure student performance specific to state content standards. All students on-track to a regular high school diploma participate in the LEAP 2025 assessments. Test results for students are reported in terms of achievement or performance levels. The performance levels include advanced, mastery, basic, approaching basic, and unsatisfactory. Louisiana's performance levels are consistent with the definitions of basic, proficient, and advanced used by the National Assessment of Educational Progress (NAEP) (Louisiana Department of Education, 2018).

While Louisiana has made great strides in increasing life opportunities for students, serious challenges remain in Louisiana's schools, as evidenced by state assessment data. Historically, children from disadvantaged backgrounds face the greatest number of challenges academically, socially, and emotionally (Louisiana Board of Regents, 2010). In the early part of the 21st century, Louisiana had the highest percentage of young adults in the nation who were neither employed nor enrolled in school or college. Nearly one in four Louisiana students did not graduate from high school, and of those who graduated and went on to college, nearly one-third had to repeat a high school course (Louisiana Board of Regents, 2010).

According to Betebenner and Linn (2010), accountability should be based on the combination of student achievement levels and growth measures. For example, the process of student learning can be measured over a period of time in various ways, including using a value-added model. Value-added models are often used to estimate the teacher or school contribution to student achievement (Betebenner & Linn, 2010). In

other words, the value-added model answers whether the teacher and/or the school had a positive effect, a negative effect, or a neutral effect on student achievement by using gain scores to estimate the value that was added to the students' education. The authors reported that in addition to the federal mandates to measure teacher effectiveness using value-added models, funding for schools and districts could be associated with principal effectiveness through the use of student growth data. School districts in Louisiana have used the value-added model to measure student progress in learning as well as determining effectiveness ratings for teachers since 2010 (Louisiana Department of Education, 2017a).

In an effort to address continued achievement gaps in Louisiana and in accordance with the ESSA framework, the Louisiana Department of Education (2017a) developed several unique improvements to its K-12 system (a) raise expectations for all students, (b) reduce state testing, (c) recognize growth for all students, (d) create a diploma pathway for disabled students, (e) deliver targeted funding to students and schools who are the most in need, (f) foster and fund relationships between persistently struggling schools and partners that demonstrated success in turning around struggling schools, (g) institute full-year residencies for future teachers under a mentor educator, and (h) provide every student with opportunities for enriching experiences.

The Louisiana Department of Education (2017a) has worked hard to raise expectations for students, and as a result, students are performing at higher levels than ever before. Louisiana's high school cohort graduation rate increased from 78.2 percent in 2017 to 81.4 percent in 2018 (Louisiana Department of Education, 2019). The graduation rate improved 9.1 percentage points since 2012, a faster pace over time than

the national growth of only 4.6 percentage points (Louisiana Department of Education, 2019). According to 2018 LEAP results at the elementary and middle school level, Louisiana students are progressing at a faster pace in ELA than in math (Louisiana Department of Education, 2018). About 48 percent of students statewide demonstrated top growth on the LEAP 2025 ELA assessment, compared to 43 percent on the math assessment. Historically, disadvantaged groups of students demonstrated top growth statewide, but accelerated progress is needed to close achievement gaps with peers. For example, 46 percent of all students across all assessments demonstrated top growth, while 43 percent of black students, 45 percent of economically disadvantaged students, 46 percent of English learners, and 43 percent of students with disabilities achieved top growth across all assessments.

The three critical shifts in the accountability system include (a) mastery of fundamental skills will be the measure for schools to earn an "A" in Louisiana's letter grade system, (b) up to 25% of the school rating calculation includes a growth index representing every individual students' progress toward mastery of fundamental skills and how the students are advancing compared to peers, and (c) expanding the school performance score formula to emphasize interests and opportunities for all students.

As Beane and Lipka indicated in their research (2006), a successful middle school was measured by the growth of students both academically and socially; thus, the implementation of the middle school concept and all the components of practice was paramount. The school schedule supported the level at which the middle school concept thrived. Protecting instructional and planning time for teams of middle school teachers

and their students was a priority. Researching the potential academic benefits of school structure became necessary in a highly data-driven accountability system.

Conclusion

This chapter presented a review of the historical context of the junior high school and the formation of middle-level schooling along with the characteristics of a successful middle school outlined as the Middle School Concept. The transition from junior high schools serving students in grades seven, eight, and/or nine based on high school organization and practices to serving the needs of grade six to eight students in what is known today as the middle school was not an easy reformation. Middle school advocates outlined the benefits of the middle school concept. Breaking the cycle of fixed time schedules and the elimination of high school practices such as content departmentalization was imperative to improve culture and meet the needs of young adolescents exiting elementary schools. A close look at scheduling practices to maximize the use of existing time, as pointed out by the National Commission on Excellence in Education (1983), could have a positive influence on the school's instructional program and the learning environment.

In a time of accountability shifts in the state of Louisiana for public schools, it is the optimal time to analyze middle school organization and the impact it may have on student achievement in mathematics. The goal of this study is to provide quantitative results for math achievement among students in grades six, seven, and eight in Louisiana schools utilizing block scheduling compared to middle schools utilizing a traditional six, seven, or eight period day. The relationship between the two common forms of middle school scheduling and student achievement will be examined. The findings of this study

will show whether or not a particular schedule type at the middle level demonstrates an impact on student academic success.

CHAPTER 3

METHODOLOGY

Introduction

The study used historical performance data to quantitatively measure the effect of current middle school scheduling practices on Louisiana student achievement in mathematics. The 2018 math assessment results from the Louisiana Educational Assessment Program 2025 (LEAP 2025) were used to study the relationship between students attending schools operating on a traditional bell schedule and those attending schools utilizing a form of block scheduling. A traditional bell schedule contains multiple periods of instruction per day – typically six, seven, or eight periods each with an equal amount of instructional time. Students move to various teachers to study different subjects each day (Hackmann et al., 2002). Under the block scheduling model, students attend fewer classes per day for longer periods of time (Williamson, 2009).

The purpose of this study was to determine if a particular scheduling practice had a significant effect on student mathematics performance in Louisiana public middle schools. This study may provide valuable information to state, district, and school-level leaders with regard to scheduling practices at the middle school level and student performance in mathematics, which may inform policy. This chapter discusses the methodology used for comparing middle school student achievement in mathematics in schools using the block schedule or the traditional schedule structure.

Research Design

This study was designed to determine whether a particular scheduling practice in Louisiana public schools serving students in grades six, seven, and eight had a significant effect on student mathematics achievement. The 2018 student achievement in Louisiana revealed consistently lower performance in mathematics compared to the other content areas across grades six, seven, and eight; thus, 2018 math proficiency and mastery scores were used in this study. The quantitative design of this study utilized one set of numerical data (i.e., student achievement results in mathematics) along with one categorical set of data containing two levels (i.e., traditional and block scheduling) to answer the research questions.

The research design was nonexperimental because the researcher had no control over the independent variable, which was schedule type (Gall, Borg, & Gall, 2007). A typical experimental design includes a pretest and posttest to measure a variable before experimental treatment is administered. By using math proficiency and mastery scores from the summative LEAP 2025 math assessment, the research study attempted to describe a possible relationship between middle school scheduling practices and student academic performance without using the pretest and posttest method, nor did the researcher manipulate the variables in this nonexperimental design.

The schedule type used at the Louisiana public middle schools in this study was the independent variable and was provided by school leaders through a survey. The dependent variables were math proficiency and mastery scores on the LEAP 2025 for students in grades six, seven, and eight. Certainly, there were many other variables that had an impact on student and school success, such as student attendance, instructional

pedagogy, teacher experience, parental involvement, and student engagement, but these variables were not analyzed.

Research Questions

Research Question 1: Is math achievement, as measured by percent proficient on the Louisiana yearly assessment, greater among middle school students in grades six, seven, or eight in a school utilizing block scheduling compared to a middle school utilizing a traditional six, seven, or eight period day?

Research Question 2: Is there a greater percentage of sixth, seventh, or eighth-grade students performing in the mastery or above range on the Louisiana yearly assessment in mathematics when those students attended a school utilizing a block schedule versus those students attending a middle school on a traditional six, seven, or eight period day?

Research Hypotheses

The following research hypotheses addressed research question one regarding Louisiana middle school students' math proficiency on the state assessment, LEAP 2025, in the spring of 2018.

H1: There will be a statistically significant difference in the levels of math proficiency among Louisiana sixth graders in a school utilizing block scheduling compared to a middle school utilizing a traditional six, seven, or eight period day.

H2: There will be a statistically significant difference in the levels of math proficiency among Louisiana seventh graders in a school utilizing block scheduling compared to a middle school utilizing a traditional six, seven, or eight period day.

H3: There will be a statistically significant difference in the levels of math proficiency among Louisiana eighth graders in a school utilizing block scheduling compared to a middle school utilizing a traditional six, seven, or eight period day.

The following research hypotheses addressed research question two regarding Louisiana middle school students' performance at the mastery or advanced level on the mathematics portion of the state's yearly assessment, LEAP 2025, in the spring of 2018.

H4: There will be a statistically significant difference in the percent of sixth-grade students performing in the mastery or above range on the Louisiana yearly assessment in mathematics when those students attended a school utilizing a block schedule versus those students attending a middle school on a traditional six, seven, or eight period day.

H5: There will be a statistically significant difference in the percent of seventh-grade students performing in the mastery or above range on the Louisiana yearly assessment in mathematics when those students attended a school utilizing a block schedule versus those students attending a middle school on a traditional six, seven, or eight period day.

H6: There will be a statistically significant difference in the percent of eighth-grade students performing in the mastery or above range on the Louisiana yearly assessment in mathematics when those students attended a school utilizing a block schedule versus those students attending a middle school on a traditional six, seven, or eight period day.

Population and Sample

The focus of this study was on public middle schools across the state of Louisiana. The entire population for the study to draw from was 302 traditional public

schools in 60 parishes and school districts across the state of Louisiana, containing at least three consecutive grades of six, seven, and eight. Forty-nine or 82% of the 60 Louisiana school districts approved the study; thus, this study included 230 schools of the total population. Of those 230 schools, 180 schools containing grades six, seven, and eight became part of the sample for the study. However, one school did not contain enough students (i.e., 10 or greater according to state accountability guidelines) to report a mathematics proficiency or mastery score. As a result, 179 schools, which was 59% of the total population, were part of the sample for the study.

The total population of sixth, seventh, and eighth-grade students enrolled in Louisiana public schools was 100,932 as of February 1, 2018. The study included a total of 57,918 students in the three consecutive grades, which is 57% of the total population. Table 3 shows the enrollment counts by grade level for the population and the sample.

Table 3

February 2018 Enrollment of Students Attending Louisiana Public Schools

Grade	Population	Sample
6	33,803	19,406
7	33,637	19,470
8	33,492	19,042
Total	100,932	57,918

School participation criteria included the stability of the schedule. Based on survey results, only schools that used the same type of scheduling format for at least the two consecutive school years of 2016-2017 and 2017-2018 were included in the study to ensure a level of stability. According to Fixsen, Naoom, Blase, Friedman, and Wallace (2005), the consensus among educational researchers was that it takes two to four years for a new initiative to be fully implemented and operational across a school or

district. Thus, a potential limitation to the study was the number of years a specific school schedule had been implemented at a site that could have significantly reduced the number of schools included in the final analysis. All 179 schools had either a traditional or a form of block schedule in place for a minimum of two years.

All Louisiana sixth, seventh, and eighth-grade students enrolled in public schools were required to take the LEAP 2025 assessment in all four core subject areas of English Language Arts, mathematics, science, and social studies. School-wide data was used, not individual student data; thus, there was no breach in confidentiality of personally identifiable information. Lastly, individual districts nor individual schools were identified by name in the research findings.

Overview of Participating Schools

Schools eligible for participation in the study were of various school configurations. The study required schools to contain at least the three consecutive grades of six, seven, and eight. Within the 2018 sample, 39 schools contained grades preschool to twelve, 19 schools contained grades four to eight, four to twelve, or six to twelve, 33 schools contained grades preschool to eight or grade one to eight, and 88 schools were arranged as grades five to eight or six to eight. By definition, middle schools contain grades five to eight or six to eight.

Schools were organized by the total enrollment of sixth, seventh, and eighth graders. Since 50% of the sample schools contained more grade levels than the official grade levels of six, seven, and eight as defined by Alexander and George (1993), enrollment size was determined by isolating the number of students served exclusively in grades six, seven, and eight in order to provide equity in the data comparisons. The

number and percent of schools in each enrollment range are listed in Table 4 for all schools eligible to participate in the study. Table 5 shows the number and percent of schools in each enrollment range of all the schools responding to the scheduling survey and that were part of the study.

Table 4

Classification of Eligible Sample School Population According to February 2018 Enrollment of Students in Grades Six, Seven, and Eight

Enrollment	Number of Schools	Percent of Schools
1-200	95	41
201-499	86	38
500+	48	21
Total	229	100

Table 5

Classification of Actual Sample School Population According to February 2018 Enrollment of Students in Grades Six, Seven, and Eight

Enrollment	Number of Schools	Percent of Schools
1-200	77	43.0
201-499	65	36.3
500+	37	20.7
Total	179	100

Of the 179 schools in the sample, 124 used traditional scheduling with 55 using a form of block scheduling, which provided extended blocks of time for math instruction at the sixth-grade level prior to and during the 2017-2018 school year. During the same timeframe at the seventh-grade level, 127 schools used traditional scheduling and 52 utilized a form of block scheduling. Lastly, 124 schools used traditional scheduling and 51 implemented a form of block scheduling at the eighth-grade level prior to and during the 2017-2018 school year. Four schools within the eighth-grade group were not included

in the results because math scores were not reportable due to the school having less than 10 students taking the eighth-grade math assessment. Tables 6, 7, and 8 show the number of sample schools operating on a traditional or a form of block scheduling according to total enrollment for grades six, seven, and eight, respectively.

Table 6

Scheduling Type for 6th Grade

Enrollment	Number of Schools with Traditional Scheduling	Percent of Schools with Traditional Scheduling	Number of Schools with Block Scheduling	Percent of Schools with Block Scheduling
1-200	49	27	28	16
201-499	48	27	17	9
500+	27	15	10	6
Total	124	69	55	31

Table 7

Scheduling Type for 7th Grade

Enrollment	Number of Schools with Traditional Scheduling	Percent of Schools with Traditional Scheduling	Number of Schools with Block Scheduling	Percent of Schools with Block Scheduling
1-200	50	28	27	15
201-499	50	28	15	8
500+	27	15	10	6
Total	127	71	52	29

Table 8

Scheduling Type for 8th Grade

Enrollment	Number of Schools with Traditional Scheduling	Percent of Schools with Traditional Scheduling	Number of Schools with Block Scheduling	Percent of Schools with Block Scheduling
1-200	46	26	27	15
201-499	50	29	15	9
500+	28	16	9	5
Total	124	71	51	29

Data Collection

Louisiana public middle schools were identified through the Louisiana Department of Education's February 1, 2018, by site database. District superintendent and individual school contact information was secured through the Louisiana Department of Education, and student performance scores were obtained from the June 2018 release. Since the scheduling information was not a public record for middle schools, a request was made to individual schools. This process began on November 14, 2019, once permission was granted from Louisiana Tech University (Appendix A) to proceed with the study.

Data for the study was collected in two clusters. First, a letter from the researcher was sent to all public-school superintendents (Appendix B) across the state of Louisiana via electronic mail. This letter requested an opportunity to collect scheduling information from Louisiana public schools containing grades six to eight in the respective districts. Superintendents were asked to complete a questionnaire electronically through Survey Monkey (Appendix C) or respond to the electronic mail request. Two electronic requests and one postal request were sent to superintendents as needed.

School scheduling information was collected from 180 district leaders or school principals. On November 16, 2019, a formal request was sent to 60 traditional public school district superintendents across the state of Louisiana via electronic mail asking for permission to reach out to the middle school principals in the respective districts and collect scheduling information. A second request was made to superintendents who did not respond as of December 10, 2019. On January 2, 2020, a final letter of request was sent to superintendents via postal mail. Of the 60 eligible districts, 50 superintendents responded, which was a response rate of 83%. Forty-nine superintendents approved for the researcher to contact middle school principals in their respective districts to collect school scheduling information. Out of the 50 superintendent respondents, only one district would not allow the researcher to collect scheduling information. Thus, the researcher was able to contact middle school principals in 82% of the eligible public-school districts in Louisiana.

Once permission was provided by each superintendent to conduct research in his or her district, a letter to the school principals (Appendix D) was sent via electronic mail. The request included a cover letter explaining the purpose of the study, the importance of and potential impact of the study, confidentiality assurances, and the critical need to complete and submit the requested information. If it was necessary, two electronic requests, as well as one postal request, were sent to principals in order to collect scheduling information from all public Louisiana schools serving students in grades six through eight.

Requests were sent to school principals identified in the state directory as leading a traditional public school containing a minimum of grades six, seven, and eight. The

total number of traditional public schools in Louisiana containing the required grade levels for the study was 302. Seventy-six percent or 230 of the state's traditional public middle schools were contacted. A total of 180 principals or district leaders responded to the researcher's request for school scheduling information, which was a 60% response rate. The researcher was able to use 179 of the total responses for data analysis, which was 59% of the state's total public middle schools.

Identification of each school's scheduling format was obtained through the brief electronic survey or postal survey sent to each principal or designated school representative (Appendix E). The scheduling survey was mailed to the schools following two attempts to gather information electronically through Survey Monkey, a free online questionnaire and data analysis website, or through an electronic mail response. Responses from the scheduling survey were compiled and reviewed. Schools were coded according to the type of scheduling design in place for at least the two consecutive years of 2016-2017 and 2017-2018. Utilizing the February 1, 2018, school data file available on the Louisiana Department of Education website, public middle schools were also sorted according to student population size and socioeconomic status.

The survey to principals was brief in order to facilitate a higher completion rate and included the following questions:

1. Does your school serve students in grades six, seven, and eight?
2. Please identify the form of scheduling in place for your middle grade (grade six, seven, and eight) students as either traditional or block.

3. If each grade follows a different scheduling structure, please briefly explain the differences (i.e., sixth-grade traditional seven period day; seventh-grade alternating block; eighth-grade four-by-four block).
4. If your school utilizes traditional scheduling for all grades (six, seven, and eight), please describe the number of instructional periods and the number of minutes allotted for each period.
5. If your school utilizes a form of block scheduling for all grades (six, seven, and eight), please specify the structure to include the number of periods and the number of minutes per period. For example, do you run an alternating day block, block schedule with five or fewer periods, or an interdisciplinary-flexible block? Please provide as many details as possible.
6. Approximately how many years (including the 2018-2019 school year and prior years only) has your school been utilizing the schedule described above? Please do not include the current 2019-2020 school year.
7. Name of school and Parish/District (will be kept confidential).

The scheduling information received from each school was reviewed in order to classify the school as utilizing a traditional or block schedule, as defined by Hackmann and Valentine (1998).

Lastly, LEAP 2025 mathematics achievement level summary data from the spring of 2018 for students in grades six, seven, and eight was obtained through the Louisiana Department of Education. Summary data was compiled based on mathematics percent proficient and percent mastery for comparison across schools.

Instrumentation

A comparative analysis was conducted to determine if there was a statistically significant difference in the group mean proficiency or mastery scores on the LEAP 2025 mathematics portion in public middle schools that have implemented either a traditional or block schedule for at least two years, including the 2016-2017 and 2017-2018 school years. Overall student achievement was determined by using average percent proficiency and average percent mastery or above on the LEAP 2025. The 2018 spring administration of the Louisiana LEAP 2025 state assessment was the instrument used for the mathematics data collection.

Louisiana Department of Education mathematics content specialists ensured the assessment items were in compliance with the guidelines provided by the Louisiana Department of Education, including alignment to the content standards and appropriateness for Louisiana students. During review, the mathematics content specialists reviewed each item for quality, clarity, style, accuracy, and appropriateness for Louisiana students while remaining in compliance with industry guidelines (Data Recognition Corporation, 2018). The Data Recognition Corporation provided evidence of construct-related validity through studies of test reliability, convergent validity, and divergent validity. The LEAP 2025 Mathematics test was designed to measure a single overall construct in mathematics achievement.

According to the Louisiana LEAP 2025 assessment publisher, Data Recognition Corporation (2018), the reliability coefficient was a ratio of the variance of true test scores to the variance of the total observed scores, with the values ranging from zero to one. The closer the value of the reliability coefficient was to one, the more consistent the

scores. The reliability coefficients for the LEAP 2025 ranged from 0.89 to 0.92 for mathematics, which were acceptable for tests of moderate lengths as the LEAP 2025. This data reflected the internal consistency and reliability of the assessment.

Standardized assessment data was gathered via Louisiana's data reports that included math achievement on LEAP 2025 for students in grades six, seven, and eight. Assessment data was collected for the assessment year 2018. The 2018 student performance results represented the first set of scores under the new accountability formula. The new formula included shifts in how many points were awarded for student achievement levels and the inclusion of student progress points. Assessment data was compiled using a spreadsheet and then sorted by schedule type once the relevant scheduling information was received by each school.

Data Analysis

The impact of scheduling on overall student achievement in mathematics was measured using average proficiency and mastery scores. A standard proficient performance on the mathematics portion of the LEAP 2025 assessment was based on a student successfully scoring at one of the top three out of five achievement levels, which included either basic, mastery, or advanced level performance. Mastery level proficiency required students to score at the mastery or advanced levels of the assessment, which were the top two levels of achievement.

The independent variable for this study was the middle school schedule type (i.e., traditional or block), and the dependent variable for the research questions was the sixth, seventh, and eighth-grade student mathematics achievement as measured by percent proficient or percent mastery. Overall student achievement in mathematics on the LEAP

2025 assessment in 2018, specifically the proficiency and mastery scores, were the dependent variables in the study. The standard proficiency and mastery data from the Spring 2018 LEAP 2025 assessment were public record and were obtained from the Louisiana Department of Education website. An independent samples t-test was used to compare the means of the two independent groups (i.e., traditional and block scheduling) to determine if a significant statistical difference existed between the traditional mean and block mean scores for math proficiency and mastery for each grade level (i.e., six, seven, and eight).

Prior to completing an independent samples t-test, it was confirmed that all data variables were gathered from different schools. Next, the significance level, or alpha level, was set in order to determine acceptance or rejection of the research hypotheses. The significance value was set at $p < 0.05$. Data analyses were performed using the Statistical Package for Social Sciences (SPSS) version 24. In SPSS, Levene's Test for Equality of Variances was used to examine whether the variances of the two groups were equal and helped determine which t-test to use. Once determined, the independent t-test for all samples was conducted in order to accept or reject the research hypotheses for the data sets.

The study was extended to include more than the one categorical variable (i.e., schedule type) as the independent variable. A general linear model was used to analyze other possible predictors or sources of variance of student performance. In addition to schedule type, the independent variables of total middle school enrollment and school socioeconomic status (i.e., economically disadvantaged) were analyzed for possible effects on the dependent variable of math achievement. Multiple-linear regression

analysis included the calculation of R-squared to determine the strength of the relationship between the three fixed factors of schedule type (i.e., block or traditional), school enrollment (i.e., sixth, seventh, and eighth combined), and socioeconomic status with the dependent variable of math achievement (i.e., proficiency or mastery on the Spring 2018 LEAP 2025) at each grade level. In addition, running an analysis of variance (ANOVA) determined if the regression was statistically significant for the group of independent factors compared to the dependent variables.

The data for the independent samples t-test and the linear regression analysis consisted of math proficiency and mastery scores from the sample population at the two different levels of the independent variable. The levels of the independent variable were block and traditional scheduling practices (Hinkle, Wiersma, & Jurs, 2003). The assumption for the study was that the observations were independent, fixed factors from the overall population. In this study, the number of Louisiana public schools running a traditional schedule compared to those schools using a form of block scheduling was not equal. In addition to the unequal groups, another limitation of the study included looking at student achievement at one moment in time, not over a period of years, and following a cohort of students as they progress through the middle grades.

Conclusion

Current scheduling practices in Louisiana middle-level schools were described as reported by participants in the study. As the researcher witnessed first-hand when exploring scheduling options at the middle school level, more instructional minutes for mathematics was the greatest need in this particular school. The desired gain by creating longer blocks of time for core areas, including math, was improved student achievement.

A well-structured scheduling system at the middle school level to include extended periods of instruction should have a positive impact on student learning and overall school performance (Biesinger et al., 2008).

The two research questions were analyzed using data collected from the Louisiana Department of Education's LEAP 2025 annual assessment in the spring of 2018 and the school scheduling information provided by schools meeting the middle-level definition of including three consecutive grades of six, seven, and eight. The results follow in the next chapter.

CHAPTER 4

RESULTS

Introduction

The purpose of this study was to determine if a particular scheduling practice had a significant effect on sixth, seventh, and eighth-grade student performance on the mathematics portion of the LEAP 2025 in the spring of 2018 in public middle schools across Louisiana. This chapter includes descriptive data used to explain the scheduling practices at the schools in the sample as well as statistical analyses examining the LEAP 2025 Spring 2018 math data.

Descriptive Statistics

The mean proficiency and mean mastery scores on the LEAP 2025 math assessment in 2018 for the sample populations according to schedule type are summarized in Tables 9 through 14.

Table 9

6^{th} Grade Math Percent Proficient

Scheduling Type	N	Mean	SD
Traditional	124	58.25	18.826
Block	55	65.47	19.050

Note. N = number; SD = standard deviation.

Table 10

6th Grade Math Percent Mastery

Scheduling Type	N	Mean	SD
Traditional	124	24.95	15.396
Block	55	30.96	18.908

Note. N = number; SD = standard deviation.

Table 11

7th Grade Math Percent Proficient

Scheduling Type	N	Mean	SD
Traditional	127	61.09	18.128
Block	52	66.10	19.270

Note. N = number; SD = standard deviation.

Table 12

7th Grade Math Percent Mastery

Scheduling Type	N	Mean	SD
Traditional	127	23.12	14.750
Block	52	30.04	19.893

Note. N = number; SD = standard deviation.

Table 13

8th Grade Math Percent Proficient

Scheduling Type	N	Mean	SD
Traditional	124	53.17	20.193
Block	51	59.08	23.324

Note. N = number; SD = standard deviation.

Table 14

8th Grade Math Percent Mastery

Scheduling Type	N	Mean	SD
Traditional	124	28.23	16.738
Block	51	34.88	23.068

Note. N = number; SD = standard deviation.

Research Questions and Hypotheses

Two research questions and six hypotheses were investigated to determine if there were statistically significant differences in middle school student mathematics achievement on the LEAP 2025 between schools using a traditional scheduling model or a form of block scheduling during the 2017-2018 school year. The following two research questions guided the study.

Research Question 1: Is math achievement, as measured by percent proficient on the Louisiana yearly assessment, greater among middle school students in grades six, seven, or eight in a school utilizing block scheduling compared to a middle school utilizing a traditional six, seven, or eight period day?

Research Question 2: Is there a greater percentage of sixth, seventh, or eighth-grade students performing in the mastery or above range on the Louisiana yearly assessment in mathematics when those students attended a school utilizing a block schedule versus those students attending a middle school on a traditional six, seven, or eight period day?

The following six research hypotheses addressed specific components of each research question and guided the statistical analyses.

H1: There will be a statistically significant difference in the levels of math proficiency among Louisiana sixth graders in a school utilizing block scheduling compared to a middle school utilizing a traditional six, seven, or eight period day.

H2: There will be a statistically significant difference in the levels of math proficiency among Louisiana seventh graders in a school utilizing block scheduling compared to a middle school utilizing a traditional six, seven, or eight period day.

H3: There will be a statistically significant difference in the levels of math proficiency among Louisiana eighth graders in a school utilizing block scheduling compared to a middle school utilizing a traditional six, seven, or eight period day.

H4: There will be a statistically significant difference in the percent of sixth-grade students performing in the mastery or above range on the Louisiana yearly assessment in mathematics when those students attended a school utilizing a block schedule versus those students attending a middle school on a traditional six, seven, or eight period day.

H5: There will be a statistically significant difference in the percent of seventh-grade students performing in the mastery or above range on the Louisiana yearly assessment in mathematics when those students attended a school utilizing a block schedule versus those students attending a middle school on a traditional six, seven, or eight period day.

H6: There will be a statistically significant difference in the percent of eighth-grade students performing in the mastery or above range on the Louisiana yearly assessment in mathematics when those students attended a school utilizing a block schedule versus those students attending a middle school on a traditional six, seven, or eight period day.

Research Hypotheses Testing

An independent samples t-test was used to test each of the six hypotheses to determine if a significant statistical difference existed between the traditional means and block means for mathematics proficiency and mastery of content by sixth, seventh, and eighth-grade students. In addition to testing the research hypotheses, the researcher expanded the study and used a multiple regression analysis and ANOVA using the general linear models function in SPSS to examine the differences in test scores. Three fixed factors of schedule type (i.e., block or traditional), total school enrollment (i.e., sixth, seventh, and eighth combined), and socioeconomic status were evaluated for their collective, but unique, influence on mathematics achievement as measured by proficiency or mastery of content by sixth, seventh, and eighth graders.

Within this study, the research hypotheses stated there would be a statistically significant difference between the performances of students in a block or traditionally scheduled school on the LEAP 2025 mathematics portion of the 2018 assessment.

Research Question 1: Is math achievement, as measured by percent proficient on the Louisiana yearly assessment, greater among middle school students in grades six, seven, or eight in a school utilizing block scheduling compared to a middle school utilizing a traditional six, seven, or eight period day?

H1 stated there would be a statistically significant difference in the levels of math proficiency among Louisiana sixth graders in a school utilizing block scheduling compared to a middle school utilizing a traditional six, seven, or eight period day. For this comparison of math proficiency scores, the p-value on Levene's test was 0.949, which was greater than the alpha level, indicating homogeneity of variance or that equal

variances can be assumed. Once the t-test was performed, a statistically significant difference was found between the mean scores of the two types of scheduling ($t(177) = -2.36$, $p = .019$) among sixth graders, as shown in Table 15.

H2 stated there would be a statistically significant difference in the levels of math proficiency among Louisiana seventh graders in a school utilizing block scheduling compared to a middle school utilizing a traditional six, seven, or eight period day. For this comparison of math proficiency scores, the p-value on Levene's test was 0.392, which was greater than the alpha level, indicating homogeneity of variance or that equal variances can be assumed. Once the t-test was performed, a statistically significant difference was not found between the mean scores of the two types of scheduling ($t(177) = -1.65$, $p = .102$, ns) among seventh graders, as shown in Table 15.

H3 stated there would be a statistically significant difference in the levels of math proficiency among Louisiana eighth graders in a school utilizing block scheduling compared to a middle school utilizing a traditional six, seven, or eight period day. For this comparison of math proficiency scores, the p-value on Levene's test was 0.083, which was greater than the alpha level, indicating homogeneity of variance or that equal variances can be assumed. Once the t-test was performed, a statistically significant difference was not found between the mean scores of the two types of scheduling ($t(173) = -1.68$, $p = .095$, ns) among eighth graders, as shown in Table 15.

Table 15

Independent Samples T-Test for Math Proficiency

Grade	t	df	p
6th	-2.36	177	.019
7th	-1.65	177	.102
8th	-1.68	173	.095

Note. t = test statistic; df = degrees of freedom; p = probability.

Research Question 2: Is there a greater percentage of sixth, seventh, or eighth-grade students performing in the mastery or above range on the Louisiana yearly assessment in mathematics when those students attended a school utilizing a block schedule versus those students attending a middle school on a traditional six, seven, or eight period day?

H4 stated there would be a statistically significant difference in the percent of sixth-grade students performing in the mastery or above range on the Louisiana yearly assessment in mathematics when those students attended a school utilizing a block schedule versus those students attending a middle school on a traditional six, seven, or eight period day. For this comparison of math mastery scores, the p-value on Levene's test was 0.064, which was greater than the alpha level, indicating homogeneity of variance or that equal variances can be assumed. Once the t-test was performed, a statistically significant difference was found between the mean scores of the two types of scheduling ($t(177) = -2.24$, $p = .026$) among sixth graders, as shown in Table 16.

H5 stated there would be a statistically significant difference in the percent of seventh-grade students performing in the mastery or above range on the Louisiana yearly assessment in mathematics when those students attended a school utilizing a block schedule versus those students attending a middle school on a traditional six, seven, or eight period day. For this comparison of math proficiency scores, the p-value on

Levene's test was 0.012, which was less than the alpha level, indicating a violation of homogeneity of variance or that equal variances cannot be assumed, and SPSS provided an alternative. However, once the t-test was performed, a statistically significant difference was found between the mean scores of the two types of scheduling ($t(75) = -2.27$, $p = .026$) among seventh graders, as shown in Table 16.

H6 stated there would be a statistically significant difference in the percent of eighth-grade students performing in the mastery or above range on the Louisiana yearly assessment in mathematics when those students attended a school utilizing a block schedule versus those students attending a middle school on a traditional six, seven, or eight period day. For this comparison of math proficiency scores, the p-value on Levene's test was 0.002, which was less than the alpha level, indicating a violation of homogeneity of variance or that equal variances cannot be assumed, and SPSS provided an alternative. Once the t-test was performed, a statistically significant difference was not found between the mean scores of the two types of scheduling ($t(73) = -1.87$, $p = .066$, ns) among eighth graders, as shown in Table 16.

Table 16

Independent Samples T-Test for Math Mastery

Grade	t	df	p
6th	-2.24	177	.026
7th	-2.27	75	.026
8th	-1.87	73	.066

Note. t = test statistic; df = degrees of freedom; p = probability.

Based on the results of the independent t-test of the sample population, sixth graders in block scheduled schools demonstrated significantly higher proficiency and mastery scores on the math portion of the LEAP 2025 assessment in the spring of 2018.

In addition, seventh graders in block scheduled schools demonstrated significantly higher mastery scores on the math portion of the LEAP 2025 assessment in the spring of 2018.

Expanded Research

Louisiana reports subgroup performance based on race, socioeconomic status, and English proficiency. Since the math performance data was not collected for individual students, a follow-up analysis based on race and English Language proficiency was not possible. However, total enrollment in sixth, seventh, and eighth grade, along with the socioeconomic status for the whole school, was available. Thus, a supplemental, multiple-linear regression analysis was completed for each grade level sample. Under the regression model, the researcher wanted to know if the fixed independent factors of schedule type (i.e., block or traditional), total school enrollment (i.e., sixth, seventh, and eighth combined), and socioeconomic status together were good predictors of the dependent variable of math achievement (i.e., proficiency or mastery on the LEAP 2025).

As shown in Table 17, when taken as a set, the predictors of enrollment, socioeconomic status, and schedule type accounted for 42% of the variance of sixth graders performing at the proficiency level on the mathematics portion of the LEAP 2025 in 2018.

Table 17

Percent of Variance in 6th Grade Math Proficiency Associated with the Three Fixed Independent Factors

R	R^2	Adjusted R^2	df1	df2	p
0.650	0.423	0.413	3	175	<.001

Note. R = multiple correlation; R^2 = multiple correlation squared measuring strength of association; significant at the $p < 0.05$ level.

Specifically, socioeconomic status and schedule type explained a significant amount of unique contribution to the percent of sixth graders performing at the proficiency level on the mathematics portion of the LEAP 2025 in 2018. Socioeconomic status explained more of the change in the dependent variable, as shown in Table 18.

Table 18

Significance Level of Fixed Independent Factors on 2018 6th Grade LEAP 2025 Math Proficiency

	Coefficients			t	p
	Unstandardized	Standard Error	Standardized		
(Intercept)	113.521	5.516		20.581	<.001
Enrollment	-0.008	0.004	-0.109	-1.850	0.066
Socioeconomic	-0.763	0.070	-0.642	-10.893	<.001
Schedule	6.284	2.381	0.152	2.640	0.009

Note. significant at the $p < 0.05$ level.

As shown in Table 19, when taken as a set, the predictors of enrollment, socioeconomic status, and schedule type accounted for 42% of the variance of sixth graders performing at the mastery level on the mathematics portion of the LEAP 2025 in 2018.

Table 19

Percent of Variance in 6th Grade Math Mastery Associated with the Three Fixed Independent Factors

R	R^2	Adjusted R^2	df1	df2	p
0.648	0.420	0.410	3	175	<.001

Note. R = multiple correlation; R^2 = multiple correlation squared measuring strength of association; significant at the $p < 0.05$ level.

Specifically, socioeconomic status and schedule type explained a significant amount of unique contribution to the percent of sixth graders performing at the mastery level on the mathematics portion of the LEAP 2025 in 2018. Socioeconomic status explained more of the change in the dependent variable, as shown in Table 20.

Table 20

Significance Level of Fixed Independent Factors on 2018 6th Grade LEAP 2025 Math Mastery

	Coefficients			t	p
	Unstandardized	Standard Error	Standardized		
(Intercept)	72.132	4.838		14.910	<.001
Enrollment	-0.005	0.004	-0.070	-1.182	0.239
Socioeconomic	-0.663	0.061	-0.638	-10.793	<.001
Schedule	5.276	2.088	0.146	2.527	0.012

Note. significant at the $p < 0.05$ level.

As shown in Table 21, when taken as a set, the predictors of enrollment, socioeconomic status, and schedule type accounted for 48% of the variance of seventh graders performing at the proficiency level on the mathematics portion of the LEAP 2025 in 2018.

Table 21

Percent of Variance in 7th Grade Math Proficiency Associated with the Three Fixed Independent Factors

R	R^2	Adjusted R^2	df1	df2	p
0.691	0.477	0.468	3	175	<.001

Note. R = multiple correlation; R^2 = multiple correlation squared measuring strength of association; significant at the $p < 0.05$ level.

Specifically, socioeconomic status explained a significant amount of unique contribution to the percent of seventh graders performing at the proficiency level on the mathematics portion of the LEAP 2025 in 2018. Socioeconomic status explained more of the change in the dependent variable, as shown in Table 22.

Table 22

Significance Level of Fixed Independent Factors on 2018 7th Grade LEAP 2025 Math Proficiency

	Coefficients			t	p
	Unstandardized	Standard Error	Standardized		
(Intercept)	118.929	5.093		23.350	<.001
Enrollment	-0.008	0.004	-0.104	-1.849	0.066
Socioeconomic	-0.802	0.065	-0.696	-12.405	<.001
Schedule	3.696	2.233	0.091	1.655	0.100

Note. significant at the $p < 0.05$ level.

As shown in Table 23, when taken as a set, the predictors of enrollment, socioeconomic status, and schedule type accounted for 41% of the variance of seventh graders performing at the mastery level on the mathematics portion of the LEAP 2025 in 2018.

Table 23

Percent of Variance in 7th Grade Math Mastery Associated with the Three Fixed Independent Factors

R	R^2	Adjusted R^2	df1	df2	p
0.640	0.409	0.399	3	175	<.001

Note. R = multiple correlation; R^2 = multiple correlation squared measuring strength of association; significant at the $p < 0.05$ level.

Specifically, socioeconomic status and schedule type explained a significant amount of unique contribution to the percent of seventh graders performing at the mastery level on the mathematics portion of the LEAP 2025 in 2018. Socioeconomic status explained more of the change in the dependent variable, as shown in Table 24.

Table 24

Significance Level of Fixed Independent Factors on 2018 7th Grade LEAP 2025 Math Mastery

	Coefficients			t	p
	Unstandardized	Standard Error	Standardized		
(Intercept)	69.307	4.862		14.255	<.001
Enrollment	-0.005	0.004	-0.078	-1.298	0.196
Socioeconomic	-0.645	0.062	-0.624	-10.455	<.001
Schedule	5.899	2.131	0.161	2.768	0.006

Note. significant at the $p < 0.05$ level.

As shown in Table 25, when taken as a set, the predictors of enrollment, socioeconomic status, and schedule type accounted for 36% of the variance of eighth graders performing at the proficiency level on the mathematics portion of the LEAP 2025 in 2018.

Table 25

Percent of Variance in 8th Grade Math Proficiency Associated with the Three Fixed Independent Factors

R	R^2	Adjusted R^2	df1	df2	p
0.603	0.364	0.353	3	171	<.001

Note. R = multiple correlation; R^2 = multiple correlation squared measuring strength of association; significant at the $p < 0.05$ level.

Specifically, enrollment and socioeconomic status explained a significant amount of unique contribution to the percent of eighth graders performing at the proficiency level on the mathematics portion of the LEAP 2025 in 2018. Socioeconomic status explained more of the change in the dependent variable, as shown in Table 26.

Table 26

Significance Level of Fixed Independent Factors on 2018 8th Grade LEAP 2025 Math Proficiency

	Coefficients			t	p
	Unstandardized	Standard Error	Standardized		
(Intercept)	112.420	6.557		17.146	<.001
Enrollment	-0.012	0.005	-0.143	-2.264	0.025
Socioeconomic	-0.797	0.082	-0.608	-9.674	<.001
Schedule	3.883	2.862	0.083	1.357	0.177

Note. significant at the $p < 0.05$ level.

As shown in Table 27, when taken as a set, the predictors of enrollment, socioeconomic status, and schedule type accounted for 30% of the variance of eighth graders performing at the mastery level on the mathematics portion of the LEAP 2025 in 2018.

Table 27

Percent of Variance in 8th Grade Math Mastery Associated with the Three Fixed Independent Factors

R	R^2	Adjusted R^2	df1	df2	p
0.549	0.301	0.289	3	171	<.001

Note. R = multiple correlation; R^2 = multiple correlation squared measuring strength of association; significant at the $p < 0.05$ level.

Specifically, enrollment and socioeconomic status explained a significant amount of unique contribution to the percent of eighth graders performing at the mastery level on the mathematics portion of the LEAP 2025 in 2018. Socioeconomic status explained more of the change in the dependent variable, as shown in Table 28.

Table 28

Fixed Independent Factors on 2018 8th Grade LEAP 2025 Math Mastery

	Coefficients			t	p
	Unstandardized	Standard Error	Standardized		
(Intercept)	76.049	6.135		12.396	<.001
Enrollment	-0.012	0.005	-0.157	-2.384	0.018
Socioeconomic	-0.633	0.077	-0.541	-8.207	<.001
Schedule	4.934	2.678	0.118	1.842	0.067

Note. significant at the $p < 0.05$ level.

Summary

In summary, this chapter presented an analysis of sixth, seventh, and eighth-grade mathematics performance on the LEAP 2025 assessment in the spring of 2018. Assessment data, along with school scheduling information, was gathered from Louisiana public schools containing grades six, seven, and eight. Statistical test results were calculated to determine if differences existed in student achievement, as measured by the Spring 2018 LEAP 2025 mathematics proficiency and mastery scores, between Louisiana public middle schools using traditional and block scheduling. Outcomes were analyzed by comparing the LEAP 2025 mathematics proficiency and mastery mean scores among the two different schedule types. The next chapter presents the findings, conclusions, and recommendations for future research.

CHAPTER 5

DISCUSSION, LIMITATIONS, RECOMMENDATIONS, AND CONCLUSION

Introduction

The purpose of this study was to determine if a particular scheduling practice had a significant effect on sixth, seventh, and eighth-grade student performance on the mathematics portion of the LEAP 2025 in the spring of 2018 in public middle schools across Louisiana. An analysis of grade-by-grade performance showed math proficiency in Louisiana decreasing in grades six and seven and halting in grade eight (Louisiana Department of Education, 2018). In Louisiana public middle schools, student growth toward proficiency and mastery of standards in mathematics is slow compared to the other content areas. This chapter begins with a discussion of the findings from the analyses of the two research questions and includes the limitations of the study. The chapter concludes with recommendations for future research based on information gathered during the study.

Although challenging to identify the characteristics of an effective middle school, researchers agree creating an environment that fosters middle school student growth and achievement is important. The middle school schedule could be a powerful tool for leaders to design and implement in order to create this promising middle school learning environment reflective of values, vision, and student needs. An effective middle school

structure is dependent on many characteristics of the middle school concept and on those implementing the instructional program. In 2010, the Association for Middle Level Education stated:

> The way schools organize teachers and group and schedule students has a significant impact on the learning environment. The interdisciplinary team of two or more teachers working with a common group of students in a block of time is the signature component of high-performing schools, literally the heart of the school from which other desirable programs and experiences evolve. (p. 31)

In my previous experience as an assistant principal at the middle school level, the school leadership team recognized the need to increase our instructional capacity to improve student success. Mirroring the Louisiana data, our middle school data trends revealed a lack of progress in math; thus, the team looked to culture and the need to lay a strong foundation for the middle school concept to flourish. The school reform began with a complete restructuring of the master schedule to create an interdisciplinary team learning environment along with increasing blocks of instructional time for math and other core subjects.

These previous experiences inspired this study that focused on the organizational structure, specifically the middle school schedule, which should provide a strong foundation for the components of the middle school concept to be incorporated in the school day and create an environment leading to student success. *Prisoners of Time* emphasized the need for schools to reorganize bell schedules to dedicate more uninterrupted time for learning and professional development for teachers and to eliminate the traditional seven period day. The National Education Commission called for extended periods of learning in an effort to promote collaboration and differentiated learning activities.

This research compared math achievement among sixth, seventh, and eighth graders who received instruction on a traditional schedule with those students who attended a school utilizing a form of block scheduling that provided extended time for math instruction. The study revealed that the 2018 mean scores on the block schedule for math proficiency (i.e., top three performance bands on a five-level scale) were consistently higher than the 2018 mean scores on the traditional schedule. Also, the 2018 mean scores on the block schedule for math mastery (i.e., top two performance bands on a five-level scale) were consistently higher than the 2018 mean scores on the traditional schedule.

Within this study, the research hypotheses stated there would be a significant difference between the performances of students in a block or traditionally scheduled school on the LEAP 2025 mathematics portion of the 2018 assessment. The study sought to answer two research questions.

Research Question 1: Is math achievement, as measured by percent proficient on the Louisiana yearly assessment, greater among middle school students in grades six, seven, or eight in a school utilizing block scheduling compared to a middle school utilizing a traditional six, seven, or eight period day?

Research Question 2: Is there a greater percentage of sixth, seventh, or eighth-grade students performing in the mastery or above range on the Louisiana yearly assessment in mathematics when those students attended a school utilizing a block schedule versus those students attending a middle school on a traditional six, seven, or eight period day?

Findings and Discussion

Research Hypothesis 1 was accepted. There was a statistically significant difference in the levels of math proficiency among Louisiana sixth graders in a school utilizing block scheduling compared to a middle school utilizing a traditional six, seven, or eight period day.

In addition to the statistically significant difference between the mean proficiency scores for block scheduling and the mean proficiency scores for traditional scheduling, the socioeconomic status of the school yielded the same conclusion as being a good predictor of the overall math proficiency achievement by sixth graders. Enrollment was not a determining factor of performance.

Research Hypothesis 2 was rejected. There was no statistically significant difference in the levels of math proficiency among Louisiana seventh graders in a school utilizing block scheduling compared to a middle school utilizing a traditional six, seven, or eight period day.

Despite no statistically significant difference in the traditional mean and block mean scores, the block scheduled schools outperformed the traditional scheduled schools in seventh-grade math proficiency. The socioeconomic status of the school was determined to explain more of the change in overall math proficiency achievement by seventh graders. Enrollment was not a determining factor of performance.

Research Hypothesis 3 was rejected. There was no statistically significant difference in the levels of math proficiency among Louisiana eighth graders in a school utilizing block scheduling compared to a middle school utilizing a traditional six, seven, or eight period day.

Although not statistically significant, the block scheduled schools outperformed the traditional scheduled schools in eighth-grade math proficiency. The enrollment of sixth, seventh, and eighth graders, along with the socioeconomic status of the school, were determined to explain more of the change in overall math proficiency achievement by eighth graders.

Research Hypothesis 4 was accepted. There was a statistically significant difference in the percent of sixth-grade students performing in the mastery or above range on the Louisiana yearly assessment in mathematics when those students attended a school utilizing a block schedule versus those students attending a middle school on a traditional six, seven, or eight period day.

Coupled with the statistically significant difference between the mean mastery scores for block scheduling and the mean mastery scores for traditional scheduling, the socioeconomic status of the school yielded the same conclusion as being a good predictor of the overall math mastery achievement by sixth graders. Enrollment was not a determining factor of performance.

Research Hypothesis 5 was accepted. There was a statistically significant difference in the percent of seventh-grade students performing in the mastery or above range on the Louisiana yearly assessment in mathematics when those students attended a school utilizing a block schedule versus those students attending a middle school on a traditional six, seven, or eight period day.

In addition to the statistically significant difference between the mean mastery scores for block scheduling and the mean mastery scores for traditional scheduling, the socioeconomic status of the school yielded the same conclusion as being a good predictor

of the overall math mastery achievement by seventh graders. Enrollment was not a determining factor of performance.

Research Hypothesis 6 was rejected. There was no statistically significant difference in the percent of eighth-grade students performing in the mastery or above range on the Louisiana yearly assessment in mathematics when those students attended a school utilizing a block schedule versus those students attending a middle school on a traditional six, seven, or eight period day.

Although not statistically significant, the block scheduled schools outperformed the traditional scheduled schools in eighth-grade math mastery. The enrollment of sixth, seventh, and eighth graders, along with the socioeconomic status of the school, were determined to explain more of the change in overall math proficiency achievement by eighth graders.

As in the study conducted by Mattox et al. (2005), which revealed a significant upward trend in sixth-grade students' math achievement over a course of three years following the implementation of block scheduling at five schools, this study showed similar results. Specifically, sixth-grade performance at block scheduled schools in Louisiana was statistically significant for both the proficiency and mastery levels of achievement. The third research hypothesis that was accepted occurred at the seventh-grade level with students performing statistically different at the mastery level in block scheduled schools compared to traditional scheduling. Eighth-grade performance, although the mean scores on block scheduling were higher, was not statistically significant at either level of achievement (i.e., proficient or mastery). So, the question is raised, why was the sixth-grade performance at both levels of achievement so different

compared to no statistical difference for all of the eighth graders in the same schools utilizing block scheduling?

The greater proficiency and mastery averages in sixth-grade mathematics in block scheduled schools may be due to the inherent characteristics of block scheduling. Block scheduling offers students longer periods of learning and engagement in all or select content areas during the school day. Block scheduling supports the National Education Commission's stance on schools leveraging time to optimize student learning (National Education Commission on Time and Learning, 1994). In their study, Mattox et al. (2005) noted teachers were able to incorporate more cooperative and authentic learning experiences into the daily lessons, which are characteristics of block scheduling and had a strong impact on instructional capacity.

The assumption for this study is that sixth-grade students enter middle school and transition to a new type of scheduling, in this case, block scheduling. The block scheduling and the inclusion of other practices may have eased the transition for students moving from fifth grade to sixth grade. An area of interest would be to research the scheduling practice during the fifth-grade year from where most of the students matriculate. This is supported by Vars (1965), who stated block and flexible scheduling enabled schools to create better guidance programs for students "lost in the shuffle," and those students were typically young adolescents transitioning from elementary school to middle school.

In addition, and interesting to note is the exclusion of test data for the students who took the Algebra One course and the corresponding state assessment in eighth grade. Therefore, these students did not take the eighth-grade LEAP assessment in 2018. While

the students' Algebra One assessment scores counted in the accountability formula for the school, they could not be included in this study. Typically, the above-average math student enrolls in the Algebra One course in eighth grade. The exclusion of the students' scores in this study may have had a negative impact on the overall statistics, specifically the mean scores for traditional and block schools.

Limitations

Though this study adds to a body of research about middle school scheduling, the study is narrow and had the following limitations:

1. The study was limited to the overall mean proficiency and mastery scores on the mathematics portion of the LEAP 2025 at school sites in 2018 as opposed to individual student scores and other content areas.
2. The study was limited to one standardized test year, which only provided a snapshot of student performance instead of looking at student performance over a period of time with a cohort of students.
3. Other aspects that have an impact on student and school success, such as attendance, instructional pedagogy, and student engagement, were not analyzed.
4. The study was limited only to the independent variables of block and traditional scheduling; thus, comparisons among variations within each type of scheduling format were not included.
5. Other limitations of the study were the effect of teacher experience on student achievement and the instructional training provided to teachers. Teacher

experience and professional development for teachers who teach on a block schedule were not studied.

Recommendations for Future Research

Structuring how instructional time is allocated at the middle school level has the potential to create systemic reform and contribute to increased student achievement in mathematics. As demonstrated in the significant differences between the traditional and block mean math proficiency and mastery scores at the sixth-grade level, the shift from a primarily small environment to a more impersonal, larger school environment at the middle-level must be a smooth and supportive one. These findings also support the National Middle School Association's vision for middle school education when the group stated in *This We Believe* "the ways schools organize teachers and group and schedule students have a significant impact on the learning environment…The team is the foundation for a strong learning community characterized by a sense of family" (p. 31). The significant findings of this research study warrant further research in the following areas:

1. Replicate the study using English Language Arts, Science, and Social Studies achievement scores as the dependent variables.
2. All block schedules were grouped together into one category. Separate studies can be conducted to differentiate between the types of block scheduling (i.e., alternate day, interdisciplinary-flexible, and 4x4).
3. Disaggregate the student performance data on an individual basis in order to collect a variety of demographic variables (i.e., ethnicity, English Language proficiency, and gender).

4. Further studies could examine the influence of scheduling, if any, on the achievement of low socioeconomic students in all content areas.
5. Replicate the study involving the same schools to collect student performance and growth data over a period of time (i.e., during students' middle school years).
6. Conduct additional research and study other structural elements in place at the block school sites (i.e., interdisciplinary teaming, professional learning communities, and common team planning time).

Case studies can be conducted on the block schools to include a variety of other independent variables, including school climate, teaming, common planning, teacher experience, and professional development for teachers. In any organizational structure, Powell (2015) stated, "teaming is as powerful as the people involved…the structure provides the opportunity" (p. 114). For example, with the structure of block scheduling in place, the recommendation of conducting follow-up case studies at block scheduled schools would allow any researcher to study the effectiveness of teaming and common planning.

Conclusion

The structure of people in a school organization was clearly supported by Fisher et al. (2012) who emphasized that student achievement and school success increased when structures were in place to support the mission and vision of the school. Through their work, these researchers identified five pillars or structures that lie above the surface of a school organization and expose the culture below. One of those pillars was additional

time and support for learning. This pillar holds learning constant, not time (Fisher et al., 2012).

Based on data trends and feedback from stakeholders, additional instructional time for math and other areas of reform were recognized by my former middle school leadership team seven years ago. Thus, school reform and improvement started with the reorganization of the master schedule to allow for expanded blocks of time in the core areas, organize teams of teachers and students, incorporate common planning, and build a culture of achievement.

The National Middle School Association's updated report titled, *Turning Points 2000*, emphasized that the elements of the middle school concept coupled with strong, effective scheduling practices must be present and implemented with a high degree of fidelity for students and schools to succeed (Powell, 2015). Scheduling is the mechanism to facilitate the school's vision and goals and address all areas of curriculum, instruction, and needs of students.

The Carnegie Council on Adolescent Development (1989) suggested schools maximize instructional time, prioritize common planning among teachers, foster the important relationships with middle school students, and develop an effective schedule. Accordingly, the schedule sets the tone for the learning environment, and careful consideration must be given to the needs of the students, the teachers who serve the students, and the overall vision for school success.

Many Louisiana middle school leaders may recognize the importance of laying the foundation for continuous learning and support by leveraging the school bell schedule. The current study found that block scheduling does positively impact student

performance on the mathematics portion of the LEAP 2025 assessment. Specifically, the statistically significant difference between the traditional mean and block mean scores for sixth-grade students performing at the proficient or mastery level in mathematics on the LEAP 2025 may be an indicator that a smoother transition was created with block scheduling either intentionally or unintentionally as students move from the elementary setting to middle school.

Only implementing a block schedule will not guarantee significant differences or improvement in math achievement at the middle school level, as evidenced by the eighth-grade data in this study. While the results of this study revealed a pattern that suggests students in Louisiana block scheduled middle schools will outperform their peers in traditionally scheduled schools on the mathematics portion of the LEAP 2025, other variables must be considered before making a change in school structure. As shown in this study, a student's socioeconomic status may be a strong predictor of academic performance. Additional variables include the ethnicity of the school population, teacher experience, professional development for teachers, and the climate and culture of the school.

One type of scheduling structure might not be effective for all schools. According to Powell (2015), schools must evaluate the effectiveness of their current schedule and possible future scheduling shifts on a regular basis because the variables constantly change. Whether traditional scheduling or block scheduling, many ancillary parts drive the culture and success of a school. School scheduling can lay the foundation for student, teacher, and school success as well as allow the middle school concept to thrive as a cohesive reform package. According to Hackmann (2004), the schedule does not inform

the end but is the means to the end, and in this case, the end is school improvement and student achievement. The middle school “is an organizational, curricular, instructional, and relational environment that cannot be parsed or broken” (Dickinson, 2001, p. 4).

APPENDIX A

HUMAN USE COMMITTEE APPROVAL

LOUISIANA TECH
UNIVERSITY

MEMORANDUM

OFFICE OF SPONSORED PROJECTS

TO: Ms. Debbie Gegg and Dr. K. Kimbell-Lopez

FROM: Dr. Richard Kordal, Director of Intellectual Property & Commercialization (OIPC)
rkordal@latech.edu

SUBJECT: HUMAN USE COMMITTEE REVIEW

DATE: May 28, 2019

In order to facilitate your project, an EXPEDITED REVIEW has been done for your proposed study entitled:

"The Impact of Middle School Scheduling Practices on Adolescent Math Achievement in Louisiana Public Schools"

HUC 19-117

The proposed study's revised procedures were found to provide reasonable and adequate safeguards against possible risks involving human subjects. The information to be collected may be personal in nature or implication. Therefore, diligent care needs to be taken to protect the privacy of the participants and to assure that the data are kept confidential. Informed consent is a critical part of the research process. The subjects must be informed that their participation is voluntary. It is important that consent materials be presented in a language understandable to every participant. If you have participants in your study whose first language is not English, be sure that informed consent materials are adequately explained or translated. Since your reviewed project appears to do no damage to the participants, the Human Use Committee grants approval of the involvement of human subjects as outlined.

Projects should be renewed annually. ***This approval was finalized on May 28, 2019 and this project will need to receive a continuation review by the IRB if the project continues beyond May 28, 2020.*** **ANY CHANGES** to your protocol procedures, including minor changes, should be reported immediately to the IRB for approval before implementation. Projects involving NIH funds require annual education training to be documented. For more information regarding this, contact the Office of Sponsored Projects.

You are requested to maintain written records of your procedures, data collected, and subjects involved. These records will need to be available upon request during the conduct of the study and retained by the university for three years after the conclusion of the study. If changes occur in recruiting of subjects, informed consent process or in your research protocol, or if unanticipated problems should arise it is the Researchers responsibility to notify the Office of Sponsored Projects or IRB in writing. The project should be discontinued until modifications can be reviewed and approved.

Please be aware that you are responsible for reporting any adverse events or unanticipated problems.

APPENDIX B

LETTER REQUESTING DISTRICT PARTICIPATION

November 16, 2019

Dear Superintendent [NAME]:

My name is Debbie Gegg and I am the supervisor of accountability and assessment for Bossier Parish Schools. Currently, I am an Ed.D. candidate at Louisiana Tech University. I am in the process of conducting research on the impact of middle school scheduling on adolescent math achievement in Louisiana public schools.

The purpose of this study is to examine various scheduling options implemented at the middle school level in Louisiana public schools to determine the impact such practices may have on math achievement. Limited research has been conducted in Louisiana regarding the impact scheduling may have on middle school students' academic achievement. The goal of this study is to provide quantitative data about math achievement among students in grades six, seven, and eight in schools utilizing a form of block scheduling compared to middle schools utilizing a traditional six, seven, or eight period day. The research being conducted for this study will provide valuable evidence of current scheduling practices in the middle school setting, grades six to eight.

I am requesting permission to collect scheduling information in (Name of Parish). I would like to send a brief questionnaire to your middle school principals as soon as possible. I will request information about the middle school schedule for grades six to eight implemented at each site in your district. The questionnaire will be sent electronically and by postal mail to all middle school principals or school designee. The questionnaire will be sent to each middle school principal in your district upon receipt of your approval. All results will be anonymous and participation is voluntary. The results of the final analysis will be shared with participating districts.

Please reply "yes" to this email or click on the survey to approve my request to contact each of your middle school principals. Thank you for your support and consideration.

Sincerely,
Debbie Gegg

APPENDIX C

SUPERINTENDENT QUESTIONNAIRE INSTRUMENT

Louisiana Superintendent Permission to Send Brief Questionnaire to Middle School Principals

Welcome!

This survey contains only two questions for you to answer in order to allow me to reach out to your middle school principals. Thank you for your support of my research.

Louisiana Superintendent Permission to Send Brief Questionnaire to Middle School Principals

* 1. May I have your permission to contact your middle school principal(s) to request the type of school schedule implemented at the respective school sites during the school years 2016 to 2018?

- ◯ Yes
- ◯ No

* 2. Please indicate your parish name.

APPENDIX D

LETTER REQUESTING SURVEY PARTICIPATION

December 1, 2019

Dear Principal [NAME]:

My name is Debbie Gegg and I am the Supervisor of Accountability and Assessment for Bossier Parish Schools. Currently, I am an Ed.D. candidate at Louisiana Tech University. I am in the process of conducting research on the impact of middle school scheduling on adolescent math achievement in Louisiana public schools.

The purpose of this study is to examine various scheduling options implemented at the middle school level in Louisiana public schools to determine the impact such practices may have on math achievement. Limited research has been conducted in Louisiana regarding the impact scheduling may have on middle school students' academic achievement. The goal of this study is to provide quantitative data about math achievement among students in grades six, seven, and eight in schools utilizing a form of block scheduling compared to middle schools utilizing a traditional six, seven, or eight period day. The research being conducted for this study will provide valuable evidence of current scheduling practices in the middle school setting, grades six to eight.

I have received approval from your superintendent to reach out to you. As a principal in one of Louisiana's public middle schools, your assistance will be greatly appreciated with the completion of the questionnaire linked below. The survey is being sent to all Louisiana public middle schools which include at least three consecutive grades ranging from grade 6 to grade 8.

The student and school data available to the public does not provide a complete story of your school's success. Please click on this questionnaire which requests information about your school schedule for students in the middle grades at your site. Your participation is voluntary, but I hope you consider completing the few questions.

Thank you, in advance, for your timely response. I will share the results of my study upon its completion.

Sincerely,
Debbie Gegg

APPENDIX E

PRINCIPAL SURVEY INSTRUMENT

Middle School Scheduling in Louisiana Public Schools

Thank you for participating in my middle school scheduling questionnaire. Answering the questions should take less than 5 minutes. Your feedback is important to my research study. The information you provide will be kept confidential. School names, nor names of school personnel, will be published in the study. Answering the questions regarding schedule type at your middle school is voluntary. Thank you for your time and support of this research.

Middle School Scheduling in Louisiana Public Schools

* 1. Does your school serve students in grades 6, 7, and 8?

- ○ Yes
- ○ No

* 2. Please identify the form of scheduling in place for your middle grade (grade 6, 7, and 8) students as either traditional or block.

- ○ Traditional 6, 7, or 8+ period day
- ○ Block Schedule (example: extended blocks of time, typically 75-90 minutes, are put in place for Math instruction)
- ○ Other

Other (please specify)

3. If each grade follows a different scheduling structure, please briefly explain the differences (i.e. 6th grade traditional seven period day; 7th grade alternating block; 8th block 4x4 block).

4. If your school utilizes traditional scheduling for all grades (six, seven, and eight), please describe the number of instructional periods and the number of minutes allotted for each period.

5. If your school utilizes a form of block scheduling for all grades (six, seven, and eight), please specify the structure to include the number of periods and the number of minutes per period. For example, do you run an alternating day block, block schedule with 5 or fewer periods, or an interdisciplinary flexible block? Please provide as many details as possible.

* 6. Approximately how many years (including the 2018-2019 school year and prior years only) has your school been utilizing the schedule described above? Please do not include the current 2019-2020 school year.

* 7. Name of School and Parish/District (will be kept confidential)

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